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THE ART OF MANURING IN NEW ZEALAND.

B. C. ASTON, F.N.Z.Inst., Chemist to the Department of Agriculture.

ONE and a quarter million New-Zealanders last year spent over £1 per head on phosphates brought from overseas for manuring the soil. This fact is enough to warrant the devotion of a little thought to a big practice which shows signs of still more vigorous growth.

Phosphate, it is only right, should bulk greatest in the farmer's manure bill. Three kinds of bodies are recognized by the laws of all countries governing the sale of manures, or the stuff from which so-called artificial fertilizers are made. These are substances containing nitrogen, potash salts, and phosphates. In the markets of the world the price of these is in the order in which they are set down, nitrogen costing about five times and potash twice as much as an equal weight of phosphate. It seems providential that what is most needed for New Zealand soils should be the cheapest of the three. It is further satisfactory to know that although available nitrogenous manures are quickly leached out of the soil and disappear into the rivers and sea, phosphates are only lost to a very limited amount. New Zealand soils are for the most part well supplied with nitrogen in an insoluble or unavailable state, from which nitrogen becomes liberated in an available state from time to time sufficiently for ordinary crops. There does not seem to be any reason to worry about nitrogen or potash supplies, but the increasing demand for phosphate suggests that every precaution should be taken to ensure that the full value is obtained from the use of it.

In spite of the fact that nitrogen and potash are so dear and phosphates so cheap, the elements from which nitrogen and potash manures are made are much more abundant in nature than phosphates, four-fifths of the atmosphere consisting of nitrogen, and the soil containing much nitrogenous organic matter. The crust of the earth is estimated to contain about 2·5 per cent. of potassium, but

only 0·1 per cent. of phosphorus. The more abundant elements are dearer because they are in a state which plants cannot use as food. By natural processes more or less slowly, and by artificial methods more or less costly, these inert manurial elements may be made available.

It is fortunate for New Zealand and Australia that the farming demand in the Northern Hemisphere is predominantly for nitrogen rather than for phosphate, while the reverse is the case in the Southern Hemisphere, and that happily within a few days' steam there should be such high-grade deposits of phosphates as those existing at Nauru and Ocean Islands. The leading idea in our southern systems of manuring should be to import only the element which is absolutely deficient in the soil, as phosphate, and to rely on internal sources when the necessity arises for using those elements (nitrogen and potassium) which are present but not immediately available.

The quantities and approximate retail values of fertilizers imported into New Zealand for the year ended 31st March last were as follows, values being given in round numbers:—

	Tons.	£
Phosphates—		
Bonedust	2,452	24,500
Bone-char	396	2,500
Basic slag	45,682	247,000
Rock phosphate	108,163	702,000*
Egyptian phosphate	8,530	50,000
		£1,026,000
Potash—		
Potash salts	7,416	£65,000
Nitrogenous Manures—		£
Sulphate of ammonia	841	15,000
Nitrate of soda	816	15,000
		£30,000

* After grinding, bagging, &c.

Rock phosphate is the only one of these fertilizers which is imported in the unmanufactured state, and the figure £702,000 is arrived at by assuming that all the rock phosphate is bought by the farmer as ground rock phosphate. A large quantity, however, is made into superphosphate, which much increases the cost; and it is estimated that the portion of the imported phosphate made into super costs the farmer £350,000 more than if it had been merely used as ground rock. This amount, together with a small amount for phosphate rock locally produced and the retail value of the phosphate produced by meat-works in New Zealand (estimated to be about £50,000), makes the total amount spent for phosphates as follows:—

	£
Imported phosphates	1,026,000
Cost of making portion into super	350,000
Locally produced phosphates	50,000
	£1,426,000

To the importations of potash and nitrogenous fertilizers set out in the first table may be added the organic manures produced at local meat-works, the retail value of which is estimated at approximately £200,000. The combined value of these classes then totals the substantial sum of £295,000. The preponderance of the expenditure on phosphatic fertilizers, nevertheless, is overwhelming.

SELECTION OF APPROPRIATE FERTILIZERS.

The selection of an appropriate fertilizer for any crop is governed by a consideration of the facts relating to (1) the soil, (2) the crop, and (3) the climate.

It is important in this country that one should disregard any practice which is followed in the Old World in manuring any particular crop. The conditions of climate and soil here are entirely different from those obtaining in England, or indeed, the Northern Hemisphere, and should one endeavour to be guided by what is usual in *our* antipodes the New Zealand farmer will be sadly led astray The most striking instance of this is in the manuring of cereals. In England oat and wheat crops are manured with a fertilizer which is essentially nitrogenous, but in New Zealand it is to phosphates the farmer looks to increase his grain crop, and this is true also in Australia. It is probable that in New Zealand the rate at which nitrogenous matter becomes available is much greater than in the colder northern soils.

The soil, from the farmer's point of view, is either heavy or light, the heaviness being due to the presence of unusual amounts of clay and sometimes silt; or it may be obviously sandy or gravelly, or peaty land derived from the drainage of a swamp. In some cases dune sandy land may be converted into quite a different soil by the admixture of peaty matter. The sandy land loses all its characters peculiar to sand, and will then respond well to lime and other treatment appropriate to heavier soils.

With heavier soils, in a district with a well-distributed and good rainfall, alkaline manures such as basic super, slag, and other phosphates applied in conjunction with quicklime (but not necessarily in the same season) are indicated; with the lighter soils acid dressings and carbonate of lime. The extreme type of sandy soils should not, as a rule, be limed, but improvement in the texture should be effected by turning in green manure or applying other manures rich in organic matter. It is best not to apply alkaline manures to sandy soils, but acid and alkaline phosphates (*e.g.*, basic slag and super) may be mixed to produce a neutral manure, with every prospect of being extremely beneficial on sands. A sandy soil is a droughty soil, and successful farming on sandy soils is contingent not only on a heavy but on a well-distributed rainfall. Fortunately, some of the greatest areas of sandy lands are so interspersed with swamp lands and loams, where the conditions are exactly reversed, that defects of one type are balanced by those of the others on the same farm. The scientific farmer must apply one treatment to his sandhills and another to his swamps, and it must be remembered that extreme types of soil, whether they be excessively tenacious like clay soils or excessively friable like sands or

fine gravels, must have an extreme treatment. If artificial manures are applied to such soils without previous treatment to improve their physical state the fertilizers will be largely wasted.

With heavy clays which puddle when worked wet the application of quicklime is at the outset forced on the farmer; but sandy soils may give results for a number of years before their lack of response to fertilizers forces the farmer to realize the necessity for green-manuring. Some kinds of sandy lands containing a large amount of silt tend to pack after working and allow the surface water to lie. It is to these soils that green-manuring has now grown so necessary that further improvement must be on the lines of an organic manuring before artificials can obtain a full response from the crops.

Peaty or drained swampy soils which contain a large amount of organic matter should be treated with insoluble fertilizers *after draining*. Such soils are strong solvents of many minerals insoluble in pure water, and applications of such material as sand, clay, pumice, papa, or even gravel may be used to supply the deficiency in mineral plant-food and render the soil easier to drain and work. Basic slag or ground raw phosphate of any insoluble kind will work wonders on such lands. The lime-requirement of such lands is very high—much higher than any farmer could hope to satisfy—and therefore it is a somewhat superfluous task to determine what the lime-requirement is. The proper quantity of lime to put on such a soil is as much as the farmer can afford. This will be well within the requirement.

With these preliminary remarks on the importance of obtaining what is known as good tilth, the study of the use of artificial fertilizers may be commenced.

CLIMATIC INFLUENCES (NORTH ISLAND*).

With regard to the climate as a factor in modifying the manuring of the soil, most of the North Island has a rainfall of under 70 in., according to the rainfall map issued by the Meteorological Office. The exceptions to this are not many. Areas round Napier, Cape Palliser, and Wanganui have a rainfall of under 40 in. Gisborne has slightly more, but under 50 in. There are some very high rainfalls in a few higher levels containing areas of no agricultural importance, so that generally speaking one may say that the country is exceptionally well watered and has an average rainfall of under 70 in. Hawke's Bay has the only climate which would modify the manuring, and in this would indicate the use of superphosphate, and contra-indicate the use of basic slag where a phosphate is to be used. Or, speaking more generally, more soluble manures should be used in a climate like that of Napier, in which 33 in. of rain falls on 102 days, than in one like Auckland, where 43 in. falls on 183 days.

THE GREAT NEED OF PHOSPHATES.

In 1913, after some fourteen years spent in analysing soils from all parts of the Dominion for their manurial ingredients, for both "total"

* South Island references under climatic and other headings will be made in a later article of this series.

and "available" plant-food, the writer ("Phosphates," this *Journal*, vol. vii, p. 121) showed that, broadly speaking, soils of the northern part of New Zealand, especially those of Auckland, were much poorer in phosphate than those of the South Island. Phosphate deficiency of soil is the outstanding defect throughout New Zealand, and it is the means of supplying this deficiency that must be first considered.

All kinds of phosphates, soluble and insoluble in water, obtain a wonderful response from every crop grown on New Zealand soils. The water-soluble superphosphate, the citrate-soluble phosphate in basic super and slag, and the water- and citrate-insoluble raw phosphates all give excellent results and confirm the results of soil-analyses, which show that phosphate is universally deficient on virgin lands. Unfortunately, this general recognition of the necessity for phosphate has led to great quantities being applied year after year as a sole means of obtaining growth response. Amounts have been put on which cannot possibly have been recovered in the produce — crops and stock which are obtained from the soil.

Since this constant application of phosphate has become a stereotyped practice, it is well to consider what becomes of the phosphate, a comparatively small portion of which is removed. The Rothamsted experiments have shown that phosphate is not lost by leaching to any extent on that soil. There is therefore only one explanation why more phosphate should be required every year, and that is that it is becoming unavailable in the soil. This is especially liable to occur when a water-soluble phosphate is applied to a soil in which there is no calcium carbonate. The phosphate is precipitated in the soil, and if there is no calcium carbonate with which to combine the phosphate the latter no doubt combines with the bases, iron and aluminium. When in this form it is usually regarded as being unavailable for plant-food.

Some attempt should be made to determine whether lands which have been top-dressed for years with phosphate will yield some of their wasted phosphate fertility when treated with lime in one of its forms. But a more rational way of going to work would be to apply lime to the soil before dressing with super, thereby assuring a base in the soil to fix the super, and which at the same time does not permit the phosphate to be thrown out of action by being converted into highly unavailable compounds. We know that the calcium phosphates are all available when finely distributed in the soil, and it should be the aim of every farmer to keep the phosphates available by liming or mixing them with lime, rather than to continue to supply an acid manure year after year.

FUNCTION OF PHOSPHATE.

Phosphates of calcium hasten the growth of plants, having a very strong action on the young plant and greatly stimulating the development of roots; phosphates increase the proportion of grain to straw and lessen the time the plant takes to reach maturity. Owing to their great influence on root-development phosphates are especially valuable in use with shallow-rooting crops such as barley and turnips. Phosphate has many other functions, but one of the most noticeable effects is the extraordinary increase in palatableness of pastures top-dressed with phosphates. Stock will travel for miles to graze off top-dressed pasture,

and if a small area on a farm is dressed with phosphate and not fenced off the stock will remain on that area and graze it as closely as a lawn.

The clovers belong to a family of plants which are greatly stimulated by phosphates. Members of this family, the legumes or pod-bearing plants (Leguminosæ), can obtain the nitrogen they need from the atmosphere with the aid of certain micro-organisms which grow in attachment to the roots of legumes to their mutual good (symbiosis). Hence a dressing of calcium phosphate, by increasing the amount of clovers in a pasture, also increases the nitrogenous organic matter and so improves the soil. The organic matter by its decay creates humus, and humus makes available other plant-food, including potash. Hence application of phosphates establishes a cycle of improvement which is as far-reaching as it is important. The most nutritious pastures in England and the best dairy pastures in France are those richest in phosphates.

One cannot consider the action of phosphates on soils without at the same time taking into consideration other fertilizers, and what are called in America "amendments" to the land. An amendment is some bulky and cheap material which is used for improving the soil, but, containing no appreciable amount of nitrogen, potash, or phosphoric acid, it cannot rightly be called an artificial fertilizer. Such amendments are lime in any of its forms, stable manure, or any crude refuse used for improving the tilth but not directly for supplying plant-food. Of these carbonate of lime is in New Zealand the most important. This is merely limestone which has been dried and ground to a condition which enables it to be sown by a drill or lime-distributor. There are very few North Island types of soils which contain carbonate of lime in the virgin state. Some of the rivers which flow through papa country deposit a sediment from floods which top-dresses the land with material containing a few per cent. of carbonate of lime. The best example of this is at Gisborne ("Notes on Some Poverty Bay Soils," this *Journal*, vol. xvii, p. 196). Another instance is the material erupted at the time of the Tarawera eruption in 1886. This particular material fell as a mud, and it now contains several per cent. of a calcareous compound soluble in dilute hydrochloric acid but which is not calcium carbonate. In papa soils the calcium often exists as a carbonate to the extent of a few per cent.

Probably the most important function of carbonate of lime on New Zealand soils lies in the favourable influence which a good supply exerts both on the phosphates naturally present in the soil and on those which are artificially added. Lime prevents the formation of those phosphates of iron and aluminium which are with difficulty available as plant-food. Hilgard, the American agricultural chemist, held that where carbonate of lime was in excess, phosphates might be present in very small amounts, and yet more satisfactory returns be obtained from the land than when lime was deficient and much phosphate was added. This has been found to be the case in New Zealand. Some of the most fertile lands are those which have carbonate of lime naturally in the soil. The lesson to be learnt from this is the need of trying to economize in the application of phosphates by liming those soils which do not effervesce when a small portion is thrown into a dilute solution of spirits of salts (hydrochloric acid).

NITROGEN.

The next important plant-food to consider is nitrogen. This manurial ingredient is always found in commerce as ammonium salts, nitrate of soda, dried blood, bonedust, or sundry organic manures made by meat-works. It is most largely used in the insoluble form in proprietary mixtures. Those saline forms, the nitrates and the ammonium salts, are used to a small extent, but mainly by market-gardeners. Nitrogen has a very great influence on the leafy parts of plants, and in those crops which are grown for their leaves nitrogen is a valuable fertilizer. The amount used in this country compared with phosphates is insignificant. One may notice that nitrogen delays the maturing of the plant by encouraging the vegetative phase to retard the reproductive phase. Its action is thus opposed to that of phosphate, which hastens the fruiting stage of the plant, thereby securing early maturity and early harvests—a point of considerable importance in temperate countries with uncertain seasons.

POTASH.

Potash manures are known to exert a very favourable influence on the health of the plant, making it more resistant against the attacks of fungoid diseases. Potash is essential to the formation of carbohydrates, such as starch, sugar, and cellulose. When the supply of potash is deficient the manufacture of carbohydrates is greatly reduced. Crops rich in these compounds, such as mangolds and potatoes, are said to be specially benefited by potassic manures. Potash tends to prolong growth in cereals and to hasten maturity in mangolds. Comparatively only a small amount of potash manures is imported into New Zealand.

One would like to see authoritative experiments undertaken locally to determine the value of this class of artificials. The action of potash in stimulating the growth of clovers is stated by European authorities to be very marked. The growth of clovers is most marked in all New Zealand soils even without potash applications. Soil-analysis does not indicate any deficiency of potash in New Zealand virgin soil, and the active growth of clovers without help from any added potash would seem to bear this out. For special crops such as potatoes, mangolds, and rape it is, however, always advisable to add potash on all soils, and on black peaty soils it will probably be found beneficial for all crops. It is said that potash shows good effects on sandy or gravelly soils, but it must be remembered that New Zealand sandy soils, whether dune-sands or pumice-sands, are well supplied with potash minerals. Both magnesium and sodium salts attack the insoluble potash minerals in the soil, and liberate potash from them in a state suitable for absorption by plant-roots. Coastal lands may therefore have potash supplied naturally through the action of the sodium chloride brought ashore in the sea-spray.

THE MIXING OF FERTILIZERS.

In the mixing of fertilizers it is important for the farmer to remember one or two cardinal points. Alkaline and acid manures may be mixed only under certain conditions. Thus basic slag and superphosphate if mixed and allowed to stand will set to a hard mass, which

will, if allowed to remain long enough, have to be broken down by a sledge-hammer before it can be distributed. Hence such a mixture must only be made in small quantities at a time and distributed at once. After each day's work the drill or distributor should be thoroughly cleaned out. The alternative to this procedure is to mix in some diluent which will keep the mixture from setting. An equal bulk of dry pumice or other sand will be very useful in this work, or bonedust or ground rock phosphate may be used if available.

Another point is that alkaline manures must not be mixed with nitrogenous organic manures or ammonium salts. The quicklime or any substance which contains it, such as basic slag, must on no account be mixed with meat manure, blood and bone, or ammonium sulphate. If such a mixture is made, the valuable and volatile ammonia gas is formed, driven off into the atmosphere, and so lost to the farmer. Of course, if basic slag is first mixed with superphosphate until an acid or neutral mixture is formed, and then mixed with blood and bone, no loss will result.

Carbonate of lime may be mixed with superphosphate and mixtures containing superphosphate. Such a mixture drilled in with the seed gives an excellent result with cruciferous crops such as turnips, swedes, and rape, which greatly benefit by an alkaline manure, even on pumice or sandy soils. This is the one exception to the use of lime on pumice lands. The slag-super mixture is, however, likely to give even better results with turnips.

Kainit is a favourite potassic dressing, but it must not be mixed directly with superphosphate and allowed to stand, otherwise it will become a sticky, unmanageable mass. By using a diluent and sowing it quickly in small quantities such a mixture may be safely made. It is perfectly safe to mix superphosphate with sulphate of ammonia, but if mixed with nitrate of soda such a compound must be sown at once.

Generally speaking, any mixture may be made if enough diluent is added and the mixture is not allowed to become alkaline in the presence of ammonium salts or nitrogenous organic matter.

(To be continued.)

Cream-grading.—In his last annual report the Director of the Dairy Division makes the following remarks on this subject: "The general consensus of opinion amongst the large majority of suppliers and those in control of dairy factories is that the grading should be made compulsory. Voluntary grading would be nearer the ideal, could it be effectively carried out generally. I am of opinion that it will not be so carried out, and that the earlier a compulsory system is approved by the Department the better will it be for all interested in the dairy industry and who have the real interests of the industry at heart. Legislation is, I believe, necessary for providing for a differential payment for second-grade cream, and without this compulsory grading would be useless. Compulsory grading with differential payment would add greatly to the effectiveness of the farm-dairy instruction work."

Bee-diseases.—During 1924–25 further material was collected by the Biological Laboratory in the study of *Nosema apis*, but the organism thus far could not be associated with any specific disease. Another disease of bees—paralysis—was dealt with from a bacteriological standpoint, but from many examinations the presence of bacteria which would account for the disease could not be demonstrated.

THE BRONZE-BEETLE.

ITS HABITS AND CONTROL AS AN ORCHARD PEST.

DAVID MILLER, Entomologist, Biological Laboratory, Wellington.

MOST of the insects injurious to orchard trees and fruit in New Zealand can be successfully held in subjection by the usual spraying practices. One of the few species that so far has evaded control is the bronze-beetle (Fig. 1). This insect occurs in most parts of the Dominion, but not in all districts is it outstanding as a detrimental factor in fruitgrowing. Where it has become a pest it is conspicuous mainly for its damage to developing apples, though several other plants are attached — *e.g.*, pear, plum, peach, gooseberry, black-currant, raspberry, and blackberry.

FIG. 1. BRONZE-BEETLE. × 9.
[*Photo by E. B. Levy.*

Normally the bronze-beetle is a foliage-feeder, attacking the leaf in such a way that small shot-like holes are eaten through the lamina (Figs. 7 and 8). However, the chief damage is caused by the beetle eating patches from the epidermis and underlying tissue of developing fruit, mainly the apple, which, though not actually affecting the eating-quality as a rule, reduces the export value of the crop to a degree varying with the extent of damage to each individual apple.

The beetle attacks the apple most frequently in the vicinity of the stalk, or sometimes the stalk itself; and even the young bark at times is devoured from growing shoots. But the general surface of the apple is subject to attack, especially where clusters of fruit occur. Mr. J. H. Kidd, of Greytown,* states that when the bronze-beetle was excessively abundant one season the epidermis of the apple was not only eaten, but the fruit in many cases was devoured to the core.

Though the beetles may attack singly, it often happens that a number congregate at one spot, resulting in larger or smaller irregular areas of the apple-surface being damaged. In the case of very young fruit the smaller wounds may heal over (Fig. 3), leaving but little blemish on the mature fruit. Too frequently, however, the wounds do not heal over evenly, or, if they do, a scab-like patch of varying

*Mr. Kidd has rendered most valuable assistance in the experiments to control bronze-beetle, and has also given important information based on his observations of this insect over a number of years. We are also indebted to him for placing his trees at our disposal for experimental purposes.

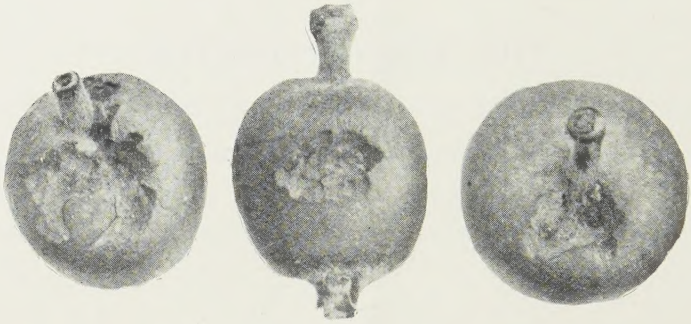


FIG. 2. YOUNG APPLES SHOWING CHARACTERISTIC DAMAGE BY BRONZE-BEETLE.

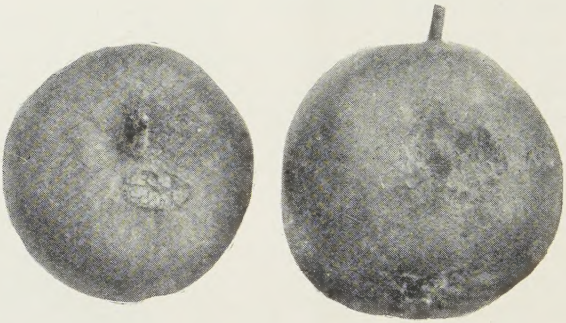


FIG. 3. YOUNG APPLES DAMAGED BY BRONZE-BEETLE, SHOWING THE WOUNDS HEALED.

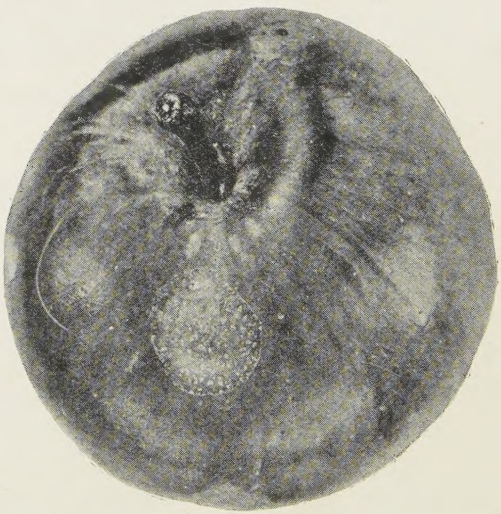


FIG. 4. MATURE APPLE WITH WOUNDS CAUSED BY BRONZE-BEETLE HEALED OVER.

[*Photos by H. Drake.*

size remains on the surface. Another characteristic result of bronze-beetle injury is malformation. This may take the form of a small scabby nodule projecting from the surface of the apple at the point of damage, or the whole side of the fruit may grow out abnormally, destroying its symmetry (Figs. 5 and 6). In some cases pronounced fissures separate the nodules when the apple has been attacked at more than one place.

Regarding the varieties of apples attacked, there seems to be a considerable difference. At Greytown, Cox's Orange and Ribston Pippin were the most severely damaged, and Gravenstein slightly so, while Delicious and Sturmer were remarkably free of injury. The clustering of apples, as in the case of Cox's Orange, has probably a good deal to do with this variety being so severely attacked, since the beetles prefer sheltered locations while feeding. This point was especially noticeable at Greytown, the beetles being not only most abundant among clustering apples, but also on the leeward side of trees during strong winds.

Concerning the life-history of the bronze-beetle but little is as yet known. This insect, like the brown or chafer beetle (*Odontria zealandica*), is mostly active over a comparatively short period during November and December of each year. Mr. Kidd, during 1924, observed the first beetles on 26th October, but in the following season (1925) they were not noticed until the first week of November, reaching a maximum between the 20th and 30th of that month. During the first week of December, when the control experiments here recorded were carried out, the beetles, though past their maximum, were still extremely abundant. Toward the close of the year the numbers become less, and only a few are on the wing early in January.

Regarding the longevity of the beetles it is of interest to note that specimens captured on 4th December lived in the Laboratory until the 30th of the month. Thus the life of the beetle may extend over a period of about one month, giving some indication of what takes place under natural conditions.

A characteristic of the bronze-beetle is its flea-like leaping habit, and the ease with which it will drop to the ground when the trees are jarred. On returning to a tree the beetles very often move along the ground toward the bole before flying up.

There is no doubt that the larvæ live in the ground, feeding on plant-roots, though no larvæ have been as yet definitely located in the field. In one place where the beetles are particularly prevalent on the trees each year, larvæ, certainly of the same group to which the bronze-beetle belongs, were dug up from among grass-roots during June, but could not be reared to maturity. In the Laboratory, beetles have laid their eggs in soil, and larvæ have hatched out but died after a few days. In the field, beetles drop from the trees and bury themselves beneath particles of soil, but, though many were followed, no actual egg-laying was witnessed. Around the base of beetle-infested trees a great number of the insects are to be found thus buried.

CONTROL.

A factor that apparently has some effect in checking the bronze-beetle is cultivation of the orchard. This is borne out by the fact

that the larvæ live underground. Mr. Kidd found that when an orchard was uncultivated, so that grass and weeds covered the ground, the beetles were extremely abundant, and apples were eaten

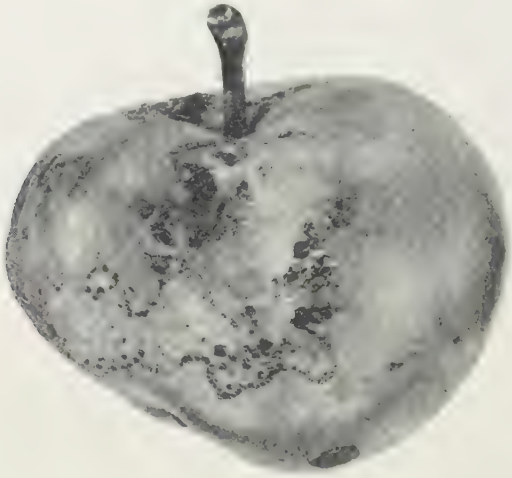


FIG. 5. MATURE APPLE SHOWING SCABBY APPEARANCE AND MALFORMATION RESULTING FROM BRONZE-BEETLE ATTACK ON IMMATURE FRUIT.

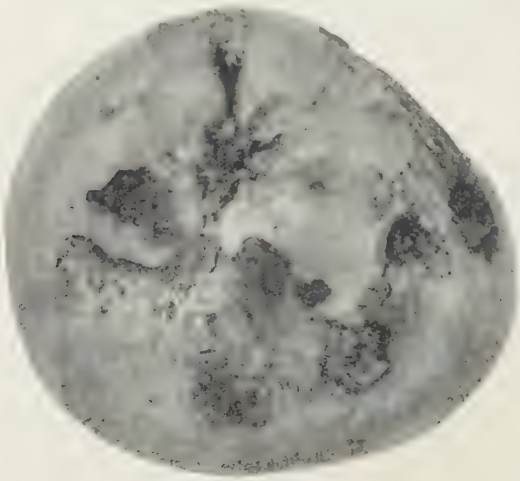


FIG. 6. MATURE APPLE SHOWING RESULT OF SEVERE DAMAGE BY BRONZE-BEETLE.

[*Photos by H. Drake.*

to the core as mentioned. Even gooseberries were so badly attacked that they had to be sorted after picking. Thorough cultivation was instituted, however, and each season, as the orchard became properly worked, the beetle infestation gradually lessened.

FIG. 8 BLACK-CURRANT LEAF SHOWING BRONZE-BLIGHT ATTACK

FIG. 7 APPLE-LEAF ATTACKED BY

Regarding insecticides, since lead arsenate has so far proved ineffective as a satisfactory means of control, it was decided to try dusting with calcium-cyanide dust, "Cyanogas Calcium Cyanide A Dust," manufactured by the American Cyanamid Company, being used. Atmospheric moisture and the cyanide interact, resulting in the evolution of hydrocyanic-acid gas.

The dusting was carried out in the open air, the trees not being enclosed in tents. The weather conditions at the time were far from ideal on account of strong winds and intermittent showers; but the results of the experiments show that there is every possibility of dusting with cyanide being a means of controlling the beetle.

With the dust an equal quantity of air-slaked lime was mixed as a carrier. An amount of 1 lb. of cyanide was applied to each tree, the trees being 18 ft. apart both ways, and 10 ft. high. A large sheet of sacking was spread on the ground beneath each tree as it was treated, so that when the beetles fell they were easily observed.

The gas liberated from the cyanide caused the beetles to fall stupefied a few seconds after application, but it was found that though many died a considerable number recovered and returned to the tree. To overcome this, three-quarters of the cyanide was blown on the tree and the remainder on the ground immediately beneath. This proved effective, and the stupefied beetles on dropping were unable to recover, being killed by the gas liberated from the cyanide applied to the ground.

It was found that approximately 75 per cent. of the beetles on each tree treated were killed. To arrive at this percentage counts were made of the dead beetles on the sheet. These were then removed and the main limbs of the tree shaken, so that most of the living beetles remaining dropped, together with a number of dead ones which had not fallen during the application of the dust. The dead beetles were discarded and only the living counted, since it was found that a proportion of living beetles would still remain on each tree. The 75-per-cent. kill was remarkably constant for each experiment.

Under ideal conditions of calm weather there is no doubt that the percentage of control would have been much higher. Though the experiments were carried out under the lee of shelter-belts, there was sufficient wind to disperse a considerable portion of the dust. The weather had been showery, though the trees were dry at the time of dust application. The temperature was 66° F.

During the experiments it was found that the best results were secured when the dust was blown on to the apples, especially clusters, since it is there that the beetles mostly congregate.

Apart from the control of bronze-beetle, the experiments showed the possibilities of calcium-cyanide dust as a general insecticide. For example, the control of apple-leaf-hopper was very close to 100 per cent., as near as could be reckoned. These leaf-hoppers dropped dead immediately the dust was applied. The effect upon aphids was also very pronounced, but in this case the best results were secured when the dust came in actual contact with the insects.

Further experiments are being carried out and will be recorded in due course.

LUCERNE-GROWING.

NOTES FOR CANTERBURY AND NORTH OTAGO CONDITIONS.

F. E. WARD, H.D.A., Instructor in Agriculture, Christchurch.

LUCERNE was introduced into New Zealand fairly early in the history of white settlement, and, although its use did not increase rapidly, since that time it has been gradually finding its place in the economic management of farms under varying soil and climatic conditions. So far as Canterbury is concerned, it is becoming recognized that the lightness of the rainfall must in many cases be a deciding factor as to the wisdom or otherwise of accepting lucerne as a regular farm-crop. In many parts of the district, however, it may be strongly recommended.

SOILS AND METHODS OF ESTABLISHMENT.

The ideal soil for lucerne may be described as a deep, rich, silty loam, though certain other types of soil have also proved their suitability for producing heavy crops. Limestone situations, and even medium-quality soils adjacent to moving underground water, have proved suitable. Three factors which aid considerably in heavy production are sunshine, shelter, and moisture. With these conditions many of our dairying districts will produce satisfactory crops. Many localities, such as the Waikari and Oamaru districts, have soils eminently suited to lucerne-growing on account of their high lime content, while certain of the better soils on the banks of our Canterbury rivers can be turned to good account owing to the presence of moving water at a depth varying from 6 ft. to 20 ft. It is regrettable to find that in many limestone situations green-feed crops such as oats are sown for sheep when lucerne would supply the need far more effectively and at considerably less cost so far as cultivation is concerned.

Under conditions such as these, where the growing of lucerne is an easy matter, the close-rowed system should be adopted. The old practice of broadcasting is giving way to the sowing through every coulter of the seed-drill (7 in. rows), as this method has many advantages over the other. No matter how well lucerne appears to do, it is necessary every now and again to give surface cultivation, and it is possible with narrow-pointed tines to cultivate between 7 in. drills with most of our rigid-tined cultivators. The rows are sufficiently close to enable a complete smothering of weeds to be effected, while retaining the advantage of cultivation without injury to the plants. Moreover, by drilling instead of broadcasting the seed it is possible to plant the seeds at a more uniform depth and therefore ensure a more even strike. If the soil conditions are good this system of growing produces a fine-stemmed plant suitable to the making of first-class hay. It also makes harvesting operations considerably easier than under the wide-rowed system.

FIG. 1. A GOOD CLOSE-DRILLED STAND OF LUCERNE IN CANTERBURY.

Rich, sheltered land of this type, or good limestone country, produces heavy crops under the 7 in. or broadcast systems.

FIG. 2. A GOOD STAND OF 14 IN. ROWED LUCERNE ON MEDIUM SOIL IN CANTERBURY.

An excellent stand for grazing.

There are certain plants which indicate the suitability of soils for lucerne-growing. Among the commonest of these in New Zealand are English trefoil or black medick (*Medicago lupulina*), burr clover (*Medicago denticulata*), spotted burr clover (*Medicago maculata*), King Island melilot (*Melilotus officinalis*), and American sweet clover (*Melilotus alba*). Where these plants are growing naturally it is practically certain that the 7-in.-drill system of lucerne-growing can be followed with safety.

An early contention was that lucerne-growing should be confined to hay-production, but experience has shown that much of the hill country in suitable districts, such as the lime-bearing areas of north Otago and the Omihi Valley, could be sown with advantage and used for grazing purposes.

On certain light lands in Canterbury lucerne has been quite successful for grazing purposes under the narrow-drilled system, but in all cases the land has been near moving water, and in most cases near streams which either find their origin in or pass through limestone country. Two of the most successful of these stands have been near lime-bearing streams at Hawarden and on the banks of the Waipara River.

The economy of sowing lucerne on the light lands of Canterbury has frequently been discussed, and it seems conclusively proved that on light land, with water at a great depth from the surface, although lucerne can be made to grow, the yields are light, and the costs of preparation and maintenance are not commensurate with the returns therefrom. If, however, a farmer requires lucerne for any special purpose on such land, the wide-rowed system of 14 in. drills should be resorted to, experiments having shown that such drills are wide enough for all necessary cultural operations. It is quite practicable to intercultivate 14 in. rows, using three tines between the rows. This is regularly done by spacing two tines to run on either side and close up to the lucerne, and the third in the centre of the row at the front; banking or ridging is thereby avoided.

Lucerne undoubtedly is a deep-rooted plant, and records of roots reaching to a depth of from 20 ft. to 30 ft. are not uncommon, but as the plant feeds almost entirely near the surface the absence of surface moisture reflects itself in light growth of the crop. It is very marked that under Canterbury conditions lucerne on light land fails to make satisfactory growth during dry weather, but should there be rainfall wetting the surface to a depth of only the first 3 in. or 4 in. there is an immediate response in the growth of the plants. This shows very clearly the need for moisture comparatively near the surface if lucerne is to be successful on our light plains soil. On certain areas such as the Prison Farm, Paparua, light lands have been turned to good account, but not without a large expenditure in lime and labour. The Department's efforts to grow lucerne on the light plains land is represented by the Bankside railway area, the result of which has not induced surrounding farmers to do likewise.

The sowing in wide drills necessitates frequent cultivation to keep grasses in check, whereas the luxuriant growth and shade produced by the narrow-rowed system is sufficient in itself to keep down grasses and weeds. A certain effort was made in Canterbury several years

ago to establish lucerne in wide drills and later to sow the interspaces with useful English grasses. It was found, however, that under the poorer soil conditions the lucerne rapidly went back when in competition with grasses and when cultivation was neglected. In many of the damper districts of New Zealand where grasses and clovers grow profusely the economy of trying to establish lucerne instead of these other valuable plants is questionable.

PREPARATION OF THE LAND.

Land intended for lucerne should be well prepared, receiving at least two ploughings and sufficient cultivation to eradicate completely all weeds of a twitchy nature. Some costly failures have come under

FIG. 3. TYPICAL LIGHT PLAINS LAND IN CANTERBURY.

Too light in quality and deficient in moisture for profitable lucerne-growing.

notice in which attempts have been made to sow lucerne on the one furrow out of tussock grassland. Owing to lack of consolidation and satisfactory movement of soil-moisture the plants have turned yellow and the stands have been a failure. The land should be prepared some time before date of sowing, so as to allow consolidation to take place, as lucerne likes a fine, firm seed-bed. When the surface soil is worked to a fine tilth the seed can be drilled in, and sufficient soil will fall in behind the coulters to cover the seed without the use of any other implement. The shallow sowing of seed is very important. Rolling before sowing is an advantage, as it firms the land and gives an even surface on which to drill.

LIMING.

In most cases liming is to be recommended. It is to a limited extent beneficial to the plant as a plant-food, but is most useful as a

sweetening agent in the soil. It makes possible the development of bacterial activity so necessary to the healthy growth of the plant. Ground burnt lime is usually cheaper per unit and more efficacious under Canterbury conditions than carbonate of lime, and applications of from ½ ton to 1 ton per acre may be made during the final cultivation of the land prior to sowing.

It has been interesting to note that in certain districts, such as on the downs near Timaru, liming has not appeared to be beneficial to the lucerne crop in any way. A more intimate knowledge of our soils will be necessary before we can determine which districts are lime-requirers and which will grow lucerne without liming. Until this information is available the matter must be experimented with by the farmer himself.

INOCULATION.

In districts of known high lime content it is seldom necessary to use inoculated soil, but on many areas it is a decided advantage prior to sowing to dress the soil with from 2 cwt. to 3 cwt. per acre of such soil. This should be harrowed in on a dull day. In taking inoculated soil from an old lucerne stand with the crop in rows the soil should be cut out close to the plants on either side of the row, and taken along each to a depth of 6 in. from the surface. If it is taken from a broadcast stand the surface vegetation should be chopped away and the soil removed to a depth of from 6 in. to 9 in. It should be first ascertained, of course, if the crop from which the inoculated soil is being taken is producing lucerne-roots well covered with nodules.

An area on the Ashburton Experimental Farm was sown to lucerne without inoculation. The lucerne-seed contained a certain amount of red clover as an impurity. It was found later that the clover-plants developed a rich healthy green colour, whereas the lucerne-plants were yellow and sickly, thus illustrating the point that the organism necessary to the development of nodules on clover (as distinguished from the medicks and melilots) does not operate in the formation of nodules on lucerne, and that where inoculation is necessary this must be effected by means of soil from a lucerne stand or pure cultures.

The treatment of lucerne-seed with pure cultures has become a very general practice in America. It has been only partly successful here, possibly due to the fact that the cultures are made in America and are frequently lacking in vitality by the time they reach this country.

SOWING.

If the land has been prepared early and is in good condition, sowing may be done in Canterbury as early as the end of September and may be continued to the end of February.

For sowing under the 7-in.-drill system from 10 lb. to 12 lb. of seed per acre is required on well-prepared land. For 14 in. drills from 6 lb. to 8 lb. is sufficient. As much seed is lost by being buried too deep, heavier applications than this have been advocated in the past. On the average soil a covering from ¼ in. to ½ in. is quite sufficient, and even on sandy soils it should not exceed 1 in.

VARIETIES.

Many varieties of lucerne have been tried in New Zealand, but so far none has suited our conditions better than the Marlborough. Certain varieties, such as South African, French Provence, and Hunter River, have done well, while Indian has been a rapid grower, giving an extra cut per season, but lacking the density and consequently the weight of our local product. Grimm lucerne is by no means a pure strain, and commercial Grimm seed contains a great mixture of types. In tests conducted by the Department of Agriculture and sowings made on many farms in Canterbury this variety —which was developed primarily as a frost-resister—has not proved suitable to our conditions. It is winter-dormant, and is the first variety to go off in the autumn and the last to come into production in the spring.

FIG. 4. SHOWING EFFECT OF MANURING ON LUCERNE.

Trial at Ashburton Experimental Farm: On left, unmanured rows; on right, rows manured with 2 cwt. super per acre. Sown in March, 1921; photo taken in following September. In the subsequent cuttings of the season the manured lucerne yielded about 75 per cent. more in weight than the unmanured.

MANURING.

There is no doubt as to the wisdom of applying phosphates to New Zealand soils in lucerne-growing. Superphosphate, at the rate of 2 cwt. per acre, at the time of sowing is to be strongly recommended, as it stimulates the rapid development of the plant and enables it to compete with weeds which almost inevitably come at the time of sowing. In certain districts top-dressing with super every few years at the rate of 2 cwt. per acre is a decided advantage. Lucerne stands sown with or without manure have shown a marked difference in favour of manure for three years following the application, and in the first year the crop has been practically doubled.

MANAGEMENT OF THE CROP.

The first growth of lucerne after sowing should be allowed to come almost to the flowering stage before cutting, as this assists in the development of the root-system and gives the plant a better chance of competing with weeds subsequently. The old recommendation of cutting when a few inches high and allowing the crop to remain on the ground as a mulch can no longer be upheld. The presence during the first season of fat-hen or other annual weeds should not unduly deter the grower. It is preferable to let the lucerne grow with the weeds and to cut according to the growth of the former. This practice gives the lucerne every chance of overcoming weed troubles in subsequent cuts.

After the initial growth the time for cutting must be determined by a close inspection of the crop. When the new shoots are coming away from the crown and are about 1 in. in length the crop should be cut. The flowering stage is a poor indication as to the time for cutting, because in the spring the crop is ready long before any sign of flowers appears, whereas the summer crop is probably ready for cutting simultaneously with the appearance of the first flowers. Analysis has shown that lucerne before flowering contains the highest quantity of protein. Under Canterbury conditions if left till flowering it is found that the quality of the hay suffers owing to the hardening of the stem and the loss of leaves; consequently earlier cutting is desirable.

Where lucerne is required for grazing it may be stocked when 9 in. to 1 ft. in height. The field should be closed till the crop is well grown, and then stocked heavily enough to eat it off in from a fortnight to three weeks, the stock then being removed. The impression that lucerne will not stand grazing has arisen from the fact that it will not tolerate constant nibbling. The system of 14 in. rows has an advantage for grazing in that the sheep walk between the rows and the lucerne is thus kept much cleaner.

The stock-carrying capacity of lucerne in the spring months is astonishing. On the Ashburton Experimental Farm lucerne in the spring of 1924 was grazed from 21st August onwards, and in the spring of 1925—a much later one—stocking began on 11th September. During the latter season 9 acres were subdivided into three blocks of 3 acres each. Each block was stocked consecutively with 120 hoggets —that is, forty hoggets per acre were fed on the block. Considering the total area (9 acres) grazed, the lucerne carried over thirteen hoggets per acre for twelve weeks continuously from 11th September. At the end of November rain fell, with a resulting increase in growth of the lucerne, and the stocking had to be increased to keep pace with this.

Grazing obviously consolidates the ground, and the free use of the cultivator must follow. Summer cultivation is not essential, but deep and thorough autumn cultivation is most strongly recommended. This leaves the ground in a rough condition during the winter, enabling the frost to act upon it, and then, with the aid of the tine harrows, a fine free surface can be obtained for the following season. Where the land has become too consolidated for grubbing, the disks, without any "set" on them, can be used to assist cultivation. Ordinary disking with the idea of cultivating the ground should, however, be avoided. It has been astonishing to find how much autumn

FIG. 5. LUCERNE AREA AT ASHBURTON EXPERIMENTAL FARM USED FOR GRAZING.

This area (a 21-in.-rowed stand) was heavily grazed three times with sheep between September and December last. The photo was taken on 24th December, and shows a growth of fourteen days since the last grazing. The lucerne area beyond the fence, on right, is seen closed for hay.

FIG. 6. SHEEP AND LAMBS GRAZING WIDE-ROWED LUCERNE AT ASHBURTON EXPERIMENTAL FARM.

cultivation can be given to stands in limestone areas without injury to the crop. Stands which the writer has seen cultivated so as to appear almost like ploughed fields have in the spring shown most prolific growth. (See Figs. 7 and 8.)

Land which has become consolidated or dirty with weeds has on occasions been skim-ploughed with satisfactory immediate results; but further observations have shown the practice to be undesirable, as considerable injury is done to the plants by cutting.

HAYMAKING.

In order to conserve the maximum amount of leaf and to retain the pliable stem, lucerne should not be allowed to dry too rapidly in the field. Management at harvest-time must, of course, depend upon weather conditions, but where a fairly dry climate prevails, the lucerne can be cut in the morning, allowed to wilt till the afternoon, and then be raked into windrows. If the weather is very drying it may be necessary to put the lucerne up into cocks so as to avoid drying taking place too rapidly. If large cocks are made it will be necessary to turn them once or twice in order to get even drying. Under normal Canterbury conditions a lucerne crop can be completely harvested in from seven to ten days. As lucerne hay absorbs water very rapidly the stack should be kept as high as possible in the middle, and when finished should be thatched or covered with a layer of straw. Lucerne should be stacked on the green side. If heating takes place in the stack the quality of the hay from the feeding point of view will not be greatly impaired. An endeavour should be made to obtain hay of a bright green and non-brittle nature.

In districts where frequent rainfall prevents the rapid making of hay the crop may be turned into silage. Owing, however, to the highly nitrogenous nature of lucerne and its great succulence it does not rank among the best crops for silage-making, though by the mixture of meadow hay or some coarser fodder it is much improved.

UTILIZATION.

The most important place that lucerne takes on the farm is in the providing of high-class hay for winter feeding, and on those soils where it can be grown easily it ranks first for this purpose. If, however, there is difficulty in procuring a satisfactory yield from the spring cut the farmer may be wiser to use short-rotation pastures of rye-grass and red clover as his main source of winter hay. Another eminently suitable crop is a mixture of autumn-sown oats and vetches, its production per acre being heavier than any other which can be grown for this purpose. Lucerne hay, however, excels the hay of either of these two crops, good and relished by stock as they may be.

It is not an easy matter to chaff lucerne, but where this can be done it makes an excellent winter feed for ewes. Grassland on the Ashburton Experimental Farm was stocked throughout the winter from May till August at the rate of ten ewes to the acre, and these were fed with lucerne chaff, consuming about 2 lb. per head per day.

They wintered excellently, and in the spring the adjoining lucerne-paddock fattened the lambs. Green lucerne is a great milk-producer for the ewes, and it enables the farmer to get the lambs fat off the mothers, and thus avoid to a large extent the need for rape. The ewes in question with their lambs were turned on to the lucerne, and in three months the lambs were sold fat off their mothers in December, 1924, for the high price of 46s. per head.

FIG. 7. LUCERNE STAND ON HILLY LIMESTONE COUNTRY IN NORTH OTAGO AS IT APPEARED IN JULY AFTER VERY SEVERE WINTER CULTIVATION.

FIG. 8. PROLIFIC SPRING GROWTH ON THE SAME AREA AS SHOWN IN FIG. 7. PHOTO TAKEN IN NOVEMBER OF THE SAME YEAR.

When it is fully realized what an important part lucerne can play in the management of the sheep-farm its popularity will no doubt further increase. The sheep-farmer usually objects to cutting hay three or four times a year, but when he realizes that a good spring cut will provide all the winter hay that is required, and that the remainder of the season's growth can be utilized for grazing, the crop will be viewed with increasing favour.

IRRIGATION.

Lucerne responds remarkably to irrigation, and many of our drier areas with comparatively poor soil conditions could be made to grow the crop successfully with this aid. As, however, the subject was recently dealt with fully in a special series of articles on "Irrigation" published in the *Journal* it will not be further treated here.

DISEASES.

Lucerne is a crop almost immune from serious diseases. Leaf-spot periodically occurs and causes a certain amount of injury in that it makes the leaves fall. As a rule, however, the trouble is confined to that particular cut of hay. When that is removed subsequent crops may be perfectly healthy. Rhizoctonia is a somewhat serious disease in certain districts of higher rainfall, but in Canterbury it is practically negligible. Sclerotia disease sometimes attacks lucerne under damp conditions, but no great injury results to the stand as a rule. This trouble appears as a white mould with black fructifications on the stems of the plant close to the ground.

SOME POINTS SUMMARIZED.

(1.) On deep silty soils and on limestone country sow lucerne through every coulter of the seed-drill—7 in. rows.

(2.) On lighter country and where the lucerne is primarily intended for grazing sow in 14 in. rows.

(3.) Prepare ground early and well, and roll before sowing. Drill very lightly, and do not harrow or roll after sowing.

(4.) In most cases, a week or two before sowing, lime with from ½ ton to 1 ton of crushed burnt lime per acre.

(5.) Sow 10 lb. per acre of seed in 7 in. drills or 6 lb. to 8 lb. in 14 in. drills.

(6.) Allow the first growth after sowing to be well grown before cutting. Subsequent cuts should be made when new shoots are showing at the crown.

(7.) In haymaking do not allow the crop to dry too quickly. Cover stacks well to keep rain out.

(8.) Chaffed lucerne hay will winter ewes well. About 2 lb. per day is required.

(9.) Green lucerne is a great milk producer. A good stand will often mean fat lambs off their mothers and lessen the necessity for rape.

TESTING OF NEW-ZEALAND-GROWN WHEATS.

RESULTS FOR YEAR 1925.

(Continued.)

L. D. Foster, B.Sc., Analyst, Chemistry Section, Wellington.

III. BAKING TESTS.

Experimental baking tests are designed to determine the actual suitability of different flours for breadmaking. In particular such tests differentiate between those flours which, though low in protein content, yet make good loaves, and those flours which, possessing a good protein content, for one reason or another fail to produce good bread. The work carried out by the Chemistry Section in 1925 has been fairly complete, and affords an insight into the behaviour of the flours obtained from the New-Zealand-grown wheats when undergoing the practical test of baking; it also shows such correlation as exists between chemical analyses and baking tests. Some additional analytical figures, to be given in another article, will elaborate this point.

To carry out baking tests accurately and efficiently, the conditions of baking must be as nearly the same in every series of loaves as it is possible to maintain them. Even baking tests, however, are not infallible, and it is not always easy to obtain absolutely concordant results. All tests, however, are done in duplicate. If, as sometimes happens, these duplicates do not approximately agree, it is then necessary to repeat tests a third and perhaps a fourth time. From an average of such a series a fairly correct idea of the breadmaking qualities of a flour may be obtained.

The method of experimental baking is standardized as far as possible. Not only must the sugar, salt, and yeast be always of the same good quality and used in exactly the same amounts, but the mixing, doughing, proving, and baking processes must be carried out under the same conditions in every case. The only differences in treatment are the amount of water added in mixing the dough, and the length of time the dough is allowed to ferment. The amount of water added is based on the percentage absorption of water.

SIZE OF LOAF.

The size, or volume, of a loaf is a measure of the quality or strength of the flour from which it is baked. A dough will expand two to three times its original volume before it reaches its maximum expansion, the time for this depending on the quality of the flour and the activity of the yeast. In the present experimental tests the dough was allowed to reach a point just short of its maximum expansion before it was placed in the oven. It is true that in commercial baking a loaf is not allowed to ferment as long as this, but a flour which gives the best loaf under the maximum expansion of laboratory baking tests will also make a loaf of good volume and texture when baked in the ordinary commercial way.

METHODS OF EXPERIMENTAL BAKING TESTS.

A greater proportion of yeast is used in experimental baking than in commercial methods, but this is to ensure that any failure on the part of the flour to produce a good loaf is not due to the lack of yeast. Sugar is also added so that there shall be no lack of material for the yeast to work upon in the initial stages of proving.

The flour, water, yeast, salt, and sugar are warmed to 35° C. (= 95° F.), and mixed. The doughs receive as nearly as possible the same amount of kneading, and are then placed in a proving-cabinet, where the fermentation proceeds under regulated conditions of temperature (35° C.) and humidity. A definite degree of dampness must be maintained to prevent the formation of skins on the doughs, which are likely to modify expansion. The doughs are placed in well-greased tins and allowed to attain almost their maximum expansion; they are then placed in the oven, where they are baked at 220° C. (= 428° F.). The tins in which the loaves are baked are all equal in

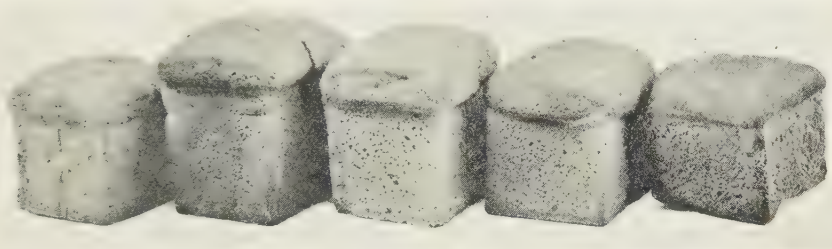


FIG. 4. SERIES OF EXPERIMENTAL LOAVES AS REMOVED FROM THE OVEN.

Loaf on extreme left baked from a commercial sample of fair average bakers' flour; the other loaves from some experimentally milled flours. Note in comparison the excellent volume of three of the latter.

[*Photo by F. T. Leighton.*

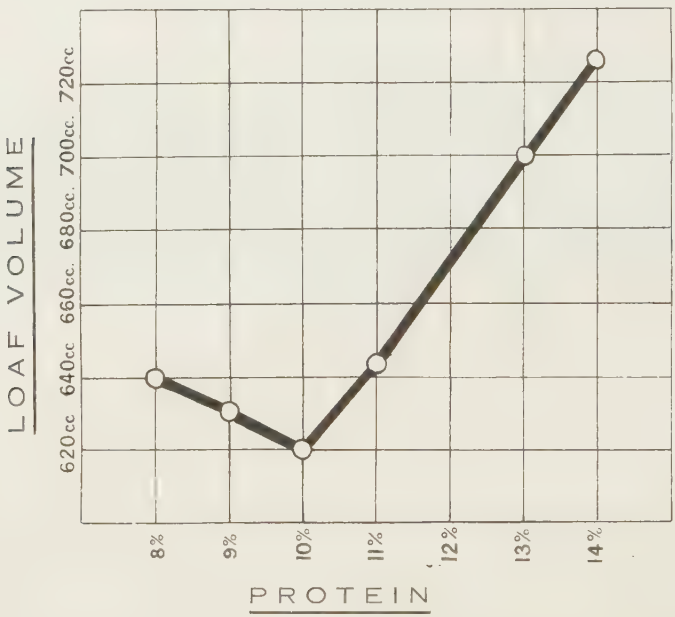
side measurements, but vary in height—namely, 2 in., 2·4 in., 2·8 in., and 3·2 in. By this variation in the height of the tins it is possible to arrange all doughs, each perhaps differing in volume from the others, with the same amount projecting, at maximum expansion, unsupported above the sides of the tins. From the shape of that portion of the unsupported loaf it is possible to obtain some idea of the strength of the flour. A dough made from a strong flour will stand up boldly; a weak dough tends to collapse and spread over the sides of the tins.

With each series of experimentally milled flours a commercial sample is included in the baking tests as a standard (see Fig. 4). The experimental flours are compared with this, as to texture, colour, &c. The commercial sample serves also as a check on the proper maintenance of conditions in doughing and proving; for if the standard flour gives the same volume each time it is baked one may assume that conditions of mixing, &c., have been the same in each series. After baking, the loaves are cooled, weighed, and their volumes measured; on the following day they are cut in halves and their texture and colour noted.

SIZE OF LOAF AND PROTEIN CONTENT.

The size of the loaf is connected, on an average, with the amount of protein the flour contains. Graph 3 shows this relationship, the average loaf-volume of the flours tested this year being plotted against the percentage of protein. To obtain these figures the flours with approximately the same amount of protein (8–9 per cent., 9–10 per cent., &c.) were classified together, and the average loaf-volumes of these classes were then determined.

It will be noticed that there was a rise in average loaf-volume for those flours containing less than 10 per cent. protein. This was apparently due to the very good *quality* of the gluten in the flours obtained from the Lake County wheats, which latter were low in protein content but made good bread.



GRAPH 3. SHOWING THE GENERAL TENDENCY OF THE LOAF-VOLUME TO INCREASE WITH INCREASING PROTEIN CONTENT.

The samples tested in 1925 provided the data upon which this graph is based. It will be noticed that below 10 per cent. protein there was an unexpected increase in loaf-volume. This reverse in the trend of the graph was perhaps due to the very good *quality* of the gluten in the Lake County flours.

NOTES ON RESULTS OF BAKING TESTS (SEE TABLE 6).

The flours from the various wheats are arranged in the same order as that adopted in Table 5 in the second article of this series (*Journal*, December, 1925, p. 381), thus enabling easy reference to be made to the chemical analyses. The percentage absorption-of-water figures are

Table 6.—Baking Tests.

Laboratory No.	Variety.	Where grown.		Absorption of Water.	Protein.	Quality of Gluten judged by Appearance.	Experimental Loaf.			
		Locality.	County.				Shape.	Texture.	Colour	Volume
				1924 Wheats.						
				Per Cent.	Per Cent.					C.c.
S 392	Durum	..	..	56·0	11·81	Poor ..	Poor ..	Fair ..	Good ..	440
S 709	Tuscan	Arrowtown	Lake ..	54·2	11·75	Fair ..	Good ..	Fairly good	..	660
S 712	,, ...	Gibbston ..	,, ..	53·2	9·38	Good ..	Fair ..	Good ..	Medium ..	660
S 708	,, ...	,, ..	,, ..	53·6	8·69	,, ..	Very good	Fair ..	Fair ..	700
S 711	,, ...	Arrowtown	,, ..	56·2	8·56	,, ..	Medium ..	Good ..	Medium ..	670
S 710	,, ...	Miller's Flat	,, ..	56·6	8·50	,, ..	Poor ..	,, ..	,, ..	620
S 713	Hunter's	Tarras ..	Vincent ..	50·8	7·69	,, ..	..	..	..	..
S 714	Velvet	Ardgour ..	,, ..	54·6	7·19	,, ..	Good ..	Good ..	Good ..	650
				1925 Wheats.						
S 774	Essex Conqueror ..	Ashburton	Ashburton	51·4	14·69	Medium ..	Good ..	Fair ..	Medium ..	755
S 775	Yeoman	,,	,,	48·0	14·19	Fair ..	,, ..	Fairly good	,, ..	700
S 769	Marquis	,,	,,	49·6	13·75	,, ..	,, ..	Good ..	Very good	660
S 779	Scandinavian ..	,,	,,	48·2	13·75	Medium ..	Medium ..	Poor ..	Medium ..	720
S 771	Velvet	,,	,,	50·0	13·56	Fair ..	Good ..	Very good	Good ..	700
S 772	Snowdrop	,,	,,	47·6	13·50	Medium ..	,, ..	Medium ..	Medium ..	700
S 770	White Tuscan ..	,,	,,	49·8	12·25	Fair ..	Medium ..	Fairly good	,, ..	670
S 778	Hybrid W	,,	,,	47·6	11·88	Medium ..	Good ..	Good ..	Good ..	660
S 773	Velvet Ngapara ..	,,	,,	50·8	11·88	Fair ..	,, ..	,, ..	Fair ..	670
T 78	Durum	Hinds ..	,,	51·6	11·81	Medium ..	Poor ..	Medium ..	,, ..	540
S 776	Zealand	Ashburton	,,	50·4	11·63	,, ..	Good ..	Good ..	Good ..	590
S 767	Queen Fair ..	,,	,,	52·8	11·31	Fair ..	Fair ..	Fairly good	,, ..	640
T 37	Velvet	Lincoln ..	Springs ..	50·0	11·13	,, ..	Good ..	Good ..	,, ..	650
T 50	Marquis	Gore ..	Southland	54·4	10·88	,, ..	,, ..	,, ..	,, ..	680
S 768	Major	Ashburton	Ashburton	50·0	10·75	,, ..	Medium ..	,, ..	,, ..	600
S 765	Jumbuck	,,	,,	60·8	10·69	,, ..	Good ..	Very good	,, ..	600
S 777	Red Fife	,,	,,	51·6	10·56	Good ..	,, ..	,,	,, ..	680
T 75	College Hunter's ..	,,	,,	51·4	10·31	Medium ..	,, ..	Good ..	,, ..	560
S 766	Queen Fan ..	,,	,,	48·8	10·31	Fair ..	Fair ..	,, ..	Fair ..	570
T 77	Solid-straw Tuscan	,,	,,	52·4	9·69	,, ..	,, ..	Medium ..	,, ..	535
T 51	Major	Gore ..	Southland	55·2	9·63	Medium ..	,, ..	Poor ..	Medium ..	680
T 52	Solid-straw Tuscan ..	,, ..	,,	54·4	9·44	Fair ..	Good ..	Medium ..	,, ..	640
T 76	College Velvet ..	Ashburton	Ashburton	51·8	9·25	,, ..	,, ..	,, ..	Good ..	630
T 101	Hybrid W	Horrelville	Eyre ..	49·4	8·75	Medium ..	,, ..	,, ..	Fair ..	580

C.c. = cubic centimetre; 100 c.c. = 6·25 cubic in.; 500 c.c. = 31·25 cubic in. (approx.).

BAKING TESTS.

(All figures read from left to right.)

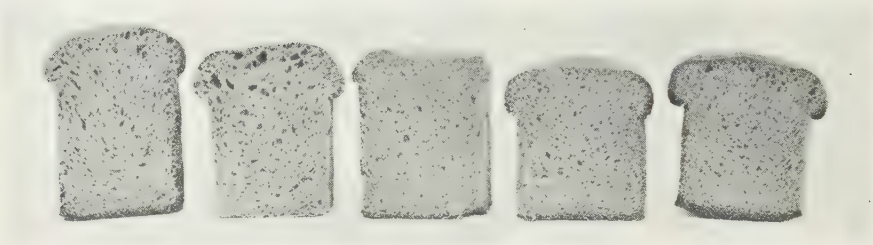


FIG. 5.

Essex Conqueror (S 774); Scandinavian (S 779); Velvet (S 771); Snowdrop (S 772); Velvet Ngapara (S 773). All from Ashburton.

FIG. 6.

Velvet, Ashburton (S 771); Essex Conqueror, Ashburton (S 774); Yeoman, Ashburton (S 775); Red Fife, Ashburton (S 777); Hybrid W, Horrelville (T 101).

FIG. 7.

Solid-straw Tuscan, Ashburton (T 77); Durum, Hinds (T 78); Durum (S 392); Solid-straw Tuscan and Durum, blended sample; College Hunter's and Durum, blended sample.

FIG. 8.

Marquis, Gore (T 50); Major, Gore (T 51); College Velvet, Ashburton (T 76); Solid-straw Tuscan, Ashburton (T 77); Velvet, Lincoln (T 37).

FIG. 9.

College Hunter's, Ashburton (T 75); Tuscan, Gibbston (S 708); Velvet, Ardgour (S 714); Marquis, Ashburton (S 769); Hybrid W, Ashburton (S 778).

[*Photos by F. T. Leighton.*

repeated, and also the percentage of protein; a description is given of the quality of the gluten as revealed by its appearance and cohesion, &c. The shape, texture, colour, and volume of the loaves are given in subsequent columns. The volumes of the experimental loaves may be compared with that of the standard loaf made from a good average baker's flour—namely, 600 c.c. Some of the loaves obtained in the baking tests are shown in Figs. 5, 6, 7, and 8. Each reproduction of the loaves has been reduced proportionally, so that any one loaf in the series may be compared with any other.

Varieties of Wheat-flours.

The 1924 wheats were of particular interest, including as they did the flours obtained from Lake County wheats; these Lake wheat-flours were mostly low in protein, but contained gluten above the average in quality. They produced loaves of good volume, and decidedly larger than those other flours with the same protein content received in this and previous years. S 708 (Tuscan), in particular, produced a loaf of very good volume, very good shape, and fair texture and colour; this flour compared very favourably with the best of the flours yet tested (see Fig. 9). The others from the Lake district were very little inferior to this sample.

The sample of Durum (S 392) can definitely be described as a poor breadmaking flour when used by itself (see Fig. 7); the quality of its gluten was poor, and it failed to make even a fair loaf, in spite of the good quantity of protein it contained. It might, however, prove suitable for blending with other flours.

The best of the 1925 flours was that obtained from Essex Conqueror (see Fig. 5). This flour produced a loaf of excellent volume, good shape, and fair texture, a result which would be expected from its very good protein content. Scandinavian (see Fig. 5) gave the next best loaf-volume, but the texture of the loaf was poor, discounting considerably the good volume obtained. Yeoman (Fig. 6) made an excellent loaf of good size and shape; this sample also contained a very good amount of protein of average quality. The sample of Marquis (S 769) gave a very good loaf of good shape and texture, and very good colour; one would, however, have expected this flour to produce a loaf of larger volume. Velvet

(S 771) produced a very good loaf in every respect; Snowdrop (S 772) was as good in volume, but fell off in texture and colour. White Tuscan (S 770), Hybrid W (S 778), and Velvet Ngapara (S 773) all gave good loaves. The sample of Durum from Hinds, like the Durum grown in 1924, failed to make a good loaf, though in this case it was better than S 392 (see Fig. 7). Zealand (S 776) made a medium loaf, and one not so good as its protein content would indicate. Queen Fair (S 767) and Velvet (T 37) made good loaves, the Velvet sample being good in shape, texture, and colour. Marquis (T 50), from Gore, Southland, produced a very good loaf; the quantity of the gluten in this sample was low for such a result. The sample of Major (S 768) gave a fair loaf, as did Jumbuck (S 765); but Red Fife (S 777), with a protein content not particularly high, gave a loaf of very good volume, this no doubt being due to the good quality of the gluten which it contained. College Hunter's (T 75) gave a loaf of good shape, texture, and colour, but medium in volume. Queen Fan (S 766) was a medium flour, and Solid-straw Tuscan (T 77) poor. A sample of Major (T 51), from Gore, gave a loaf of good volume; it was fairly low in protein content. Solid-straw Tuscan (T 52) from the same locality gave a fair loaf, though it, too, was fairly low in protein content. A sample of Velvet (T 76), low in protein content, gave a fair loaf. Hybrid W (T 101) was also low in protein content, and gave only a medium loaf.

Localities.

In judging the strengths of various flours by their protein content it is fair to compare only those obtained from wheats grown under more or less similar conditions. The flours from Lake County, however, stood out in these tests as being of very good strength even though they were low in protein content. There can be no doubt that their strength depended on something apart from the quantity of gluten present: the good *quality* of the gluten which they contain may have had something to do with these good baking-properties, though even here the volume of the loaf was to a limited extent dependent on the percentage of protein in the individual samples.

The samples from Gore (see Fig. 8) also produced good loaves and better than the protein content suggested; none of these, however, contained gluten above the average in quality as far as a visual inspection of the gluten showed. A fairer comparison between samples could be made with the flours obtained from Canterbury wheats. Here the order of loaf-volume was, with few exceptions, the order of the protein content. The possible exceptions were Marquis (S 769) and Zealand (S 776), which were perhaps not so good as their protein content indicated; Durum (T 78), which was decidedly poorer; and Scandinavian (S 779), Velvet (S 771), Snowdrop (S 772), and Red Fife (S 777), which were better. The gluten of these samples appeared on inspection to be average in quality, with the exception of Red Fife (S 777).

SUMMARY.

Flour milled from Essex Conqueror produced the best loaf of those varieties tested in 1925. An excellent loaf was made from Yeoman. Samples of Velvet, Marquis, and Red Fife produced very

good loaves. The Durum flours were failures in regard to their breadmaking qualities.

The order of the strength of the flours as determined by baking tests was, on an average, also the order of the protein content of the various samples. Individual protein content and loaf-volume were more closely correlated when comparing flours from wheats coming from the same wheat-growing districts. Exceptions were the flours obtained from the wheats grown in Lake County and Southland County, which generally produced better loaves than their protein content indicated. The flours from the Lake district contained gluten above the average in quality as determined by a visual inspection of the isolated gluten; these flours were milled from Tuscan wheats. Those from Southland County, however, were of average quality in this respect.

Flours from Canterbury wheats gave results in which, with some exceptions noted, the protein content was a good index to the baking-value of the different flours.

(Series to be continued.)

PROCESSED CHEESE AND THE IRISH MARKET.

THE following notes are from a recent report received by the Director of the Dairy Division from Mr. Walter Wright, New Zealand Inspector of Dairy-produce in London :—

Regarding the development of the processed-cheese trade, I find that this product has taken on remarkably well in Ireland owing to the fact that there are such large numbers of small retailers who cannot conveniently handle a full-sized 80 lb. cheese. Some of them, in fact, prefer the Australian cheese to the New Zealand owing to the fact that the former are only about half the weight.

According to information I have received both in Belfast and Dublin, these small retailers are evidently taking on very readily the "Kraft" cheese. It is now put up in 1 lb. blocks, whereas on the initiation of this trade all the blocks were 5 lb. weight. Notwithstanding that this cheese retails at 1s. 8d. in Belfast and 1s. 10d. in the south of Ireland, a considerable trade seems to be developing right throughout the country. Although the manufacturers have commenced to pack it in the 1 lb. blocks, yet retailers, I believe, in some localities prefer the 5 lb. blocks because they can be cut up conveniently into ½ lb. portions if required, which is a matter of convenience to them.

With regard to the Irish cheese trade, from what I can gather the Irish are not a great cheese-eating people. There is a certain amount of New Zealand cheese used right throughout the country, but not to the extent I would like to be able to report. I might mention in passing, however, that the Irish people like a very pale straw-coloured cheese. Several merchants whom I interviewed advised me that, although the general quality of New Zealand cheese was satisfactory to them, the colour, generally speaking, is too deep for their trade.

Condition of Cattle-dips.—During 1924–25 an examination of samples from the public cattle-dips of the tick-infested districts was undertaken by the Department's Chemist in conjunction with the Live-stock Division. It was shown that many of the dips were in an unsatisfactory state, in some cases the dipping-fluid being far below the correct strength. Arrangements were made by which samples from every dip will be sent to the Chemical Laboratory at Wellington each month during the busy season, and each alternate month during the off season.

GRAPE-WINE-MAKING IN SMALL QUANTITIES.

DIRECTIONS FOR NEW ZEALAND CONDITIONS.

J. C. Woodfin, Vine and Wine Instructor, Horticulture Division.

For wine-making on a small scale the grapes should be quite ripe; from 13 lb. to 15 lb. are required to make 1 gallon of wine. The berries should be separated from the stalks and crushed with the hands or by rubbing them through a ½-in.-mesh wire sieve.

A wooden or earthenware vessel is required for fermenting the must. On no account should a metal one be used unless it is enamelled. The fermentation vessel should be at least one-third larger than the maturing barrel, so as to allow plenty of room for the grape-skins, which will rise to the surface and form a "cap." The lees from the first racking will also reduce the volume of wine. All vessels and utensils used in making wine must be absolutely clean and sweet, and free from mould and vinegar flavours.

If it is intended to make a dry wine—that is, a wine in which all the sugar is transformed into alcohol and carbon dioxide, the escape of which into the air in the form of gas causes the boiling of the must during fermentation—add ½ lb. of sugar to each gallon of must. If a sweet wine is to be made, add 2½ lb. to 3 lb. of sugar, according to the degree of sweetness desired.

When making a dry wine the sugar should be added before fermentation sets in, and in making sweet wine when the must is being transferred from the fermenting-vessel to the storage barrel or jar. In both cases the sugar should be thoroughly dissolved by stirring.

In seasons when the grapes do not ripen well the acidity may be too high to make a palatable wine. In making wine for home use this acidity can be reduced by adding water to the must at the rate of about ⅓ gallon to each gallon of juice, and in this case 2½ lb. of sugar must be allowed for each gallon of added water in making the dry wine, and 4 lb. when making sweet wine. The acidity should not, however, be reduced too much, or the resulting wine will prove flat and insipid, and will not keep well.

Fermentation will set in spontaneously in a day or two in a favourable temperature, which ranges about 65° F. If the weather is cold the must can be heated to 90°, and the vessel covered with a sack or some other suitable covering to keep the heat in, when fermentation will generally set in. The temperature of the must when fermenting should be from 80° to 85°. If it rises too high or sinks too low fermentation will slow down, and may stop eventually. The "cap" of grape-skins should be pushed down into the must, and the whole stirred up at least twice a day while fermentation is going on.

In the case of dry wine the must should remain in the fermenting-vessel until fermentation has apparently stopped and the skins commence to sink into the wine. The wine can then be siphoned off or run off through a tap into a storage cask, and placed in a cool cellar, where a slow fermentation will continue for some time. The skins should be pressed or wrung in a piece of hessian or some fairly open

material—previously boiled to sweeten it—and the wine extracted added to the bulk.

When making sweet wine the must can be separated from the skins after three or four days' fermentation, and, after mixing with sugar, run into a storage cask to continue its fermentation. There will be no need to store this in a cool cellar, as it will mature much quicker in a warmer temperature.

A slow fermentation will continue in the dry wine for a month or two, and in the sweet wine much longer, the exact period depending principally on the amount of added sugar. Gas will be produced as long as fermentation continues, and may cause the container to burst if it is tightly bunged. A good plan is to cover the bung-hole with a small bag of clean sand; this will keep out the air and flies, and at the same time allow the gas to escape. When used to cover the bung-holes of the barrels of fermenting dry wines or cider, these bags retain in the barrel some of the gas formed in the process of fermentation, and at the same time keep out the air, a condition unfavourable to the development of the dreaded vinegar bacteria. The container should be bunged tightly when the sizzling noise produced by the escaping gas-bubbles ceases.

At this period, when the wine has become fairly clear, it should be racked or separated from the lees. This can be accomplished by inserting a wooden tap in the barrel above the lees, or by siphoning the wine out with a rubber tube tied to a piece of cane so that the end of the tube will be a few inches from the end of the cane and above the lees in the container. Dry wine is usually racked after fermentation and at the end of the winter, twice during the following twelve months, and once or twice in subsequent years. Whenever possible cold bright weather should be chosen to perform the operation. Sweet wine is racked twice the first year and once during subsequent years, until it is quite clear and bright.

During the maturing-period of dry wines the barrels must be filled up regularly from small vessels of wine kept for the purpose to replace the wine which evaporates through the wood. If an air-space is left mould will form on the surface of the wine and will probably cause the wine to turn sour. Air on the surface of sweet wines will not have the same consequence.

Dry wines can be bottled after the first or second winter, but sweet wine should remain in the wood at least three years, and will improve if kept longer. The rubber tube used for racking can be used for bottling the wine. If it is too thick to enter the neck of the bottles a smaller tube can be inserted in the end of it, or tubing $\frac{3}{8}$ in. interior measure, such as is used for connecting gas-rings, would be suitable both for racking (on a small scale) and bottling. The bottles when filled should be kept on their sides in a cool cellar for six months before being consumed, so as to allow the wine to recover from what is known as "bottle sickness."

Where it is intended to make a large quantity of wine a Baumé hydrometer will be found useful for obtaining the exact density of the fruit-juice, for ascertaining the right amount of sugar to add when necessary, and for following the progress of the fermentation. Notes on the use of this instrument were published in the *Journal* of July last.

HORTICULTURAL EDUCATION FOR NEW ZEALAND.

INSTITUTE OF HORTICULTURE REPORT.

Report by a special committee of the New Zealand Institute of Horticulture—Dr. L. COCKAYNE, Mr. P. BLACK, and Professor H. B. KIRK—presented to the annual meeting of the Institute, 1925.

IT is impossible to overestimate the importance of horticulture to any nation, so interwoven is it into the lives of the people. Consider how it concerns not only an essential and very large part of the food-supply, but that from the æsthetic standpoint it is pre-eminent. The gardener, both professional and amateur, is indispensable to our well-being.

Nothing can be clearer than the fact that the best horticultural education procurable should be provided for those proposing to take up horticulture as a profession. But such education should go further than that, and suitable horticultural instruction should be given first in both the primary and secondary schools, and afterwards it should still continue, though working silently, by means of properly equipped botanic gardens, spacious parks, cities adorned with trees and flowers, popular horticultural writings in the newspapers, a journal devoted to gardening in all its branches, standard works and periodicals in the libraries, horticultural exhibitions, popular lectures, and so on. Finally, the goal, so far as New Zealand is concerned, is the development of a true national horticulture, worthy of the soil and the climate, and not a mere imitation of that of other lands.

This report does not go into details connected with education; such can come later. It is rather an attempt to bring together some of the principles by which we think the foregoing ideals might come to pass; but specially do we seek to put forth a practicable plan whereby the necessary training for gardeners can be provided, or, at any rate, a foundation be laid upon which, by degrees, to raise a satisfactory educational edifice.

At the present time there is in New Zealand no distinction between a gardener who is well versed in his profession and one altogether untrained who probably knows little, if anything, concerning horticulture. Nor has the public any idea what vast, many-sided knowledge is required by a really high-class horticulturist—knowledge in no whit less than in that of any of the learned professions.

To begin with, apart from horticulture proper, a fair knowledge of chemistry, meteorology, soil-science, entomology, and surveying is required, while botany demands particular attention from the physiological, structural, mycological, ecological, and systematic standpoints. Then, on the purely horticultural side a thorough knowledge is demanded of the cultivation of fruits, vegetables, and flowering-plants of all kinds (trees, shrubs, herbaceous and bulbous plants and annuals); there is gardening under glass (the coolhouse and the stove), and that of the open-air, with its many side branches, to cite from the flower-garden alone — lawns, hedges, plantations, the shrubbery, the herbaceous

border, the alpine garden, bedding-out, the rose-garden, florists' flowers, the pergola, flowers for exhibition, the water-garden. Then comes that highly skilled work the propagation of all kinds of plants, and with this there is the science of plant-breeding. There is orchard-work and all pertaining thereto; there is a close knowledge of garden pests and the means to avoid or combat such; there is landscape gardening; and there are the manifold business aspects of horticulture. Finally, though leaving much unsaid, the high-class gardener has to keep abreast of the times by reading the new literature constantly appearing.

The above is no exaggeration; it underrates rather than overstates the requirements in the domain of horticulture. Of course, no one can be properly conversant with all these branches, but when the many subjects and problems are considered which confront a director of parks and reserves, including a botanic garden, the necessary qualifications for such a post are considerable enough.

We are now in a position to deal with the most important part of this report—namely, the means for giving a sound education to those intending to gain their livelihood by horticulture. As it is considered necessary to award degrees or diplomas for all professions, and even for many trades, so is a degree or diploma necessary in the case of horticulture. Such a degree or diploma should show (1) that the possessor has a sufficient knowledge of the sciences on which horticulture is based, and (2) that he has gained by experience a thorough practical knowledge of horticulture in a wide sense.

In order to become sufficiently acquainted with the various sciences already enumerated we consider that the student should receive instruction, theoretical and practical, preferably at one or other of the University colleges. But it must be remembered that in many cases the student will have to earn his living while studying for the degree or diploma, and that he frequently will be so situated that it will be impossible for him to make use of the superior advantages these colleges offer. In cases of this kind the teaching will have to be carried out at technical schools, or even high schools. As matters are at present the science syllabuses of the University colleges are not altogether suitable for horticultural requirements, and special or modified lectures, &c., would be necessary.

This leads us up to the matter of actual horticultural training, which falls under the two heads—(1) a course or courses of lectures based on the preliminary scientific knowledge which the student has gained, and (2) the practice of horticulture. This latter would have to be acquired by a number of years' experience in one or other of the following: a botanic garden or its equivalent; a municipal garden, with its many outside activities; a nursery garden devoted to raising a general stock of plants; a large private garden—but few such would be available. Then for special work there are orchards and market-gardens.

The next point to consider is the question of a degree or diploma. If a degree is decided on it would have to be conferred by the University of New Zealand. Doubtless such a degree is desirable, and some day it will come, should the demand arise, but it seems to us premature at the present time. Though an entirely satisfactory qualification is essential, if that can only be reached by means of a university degree

by far the greater part of those desirous of becoming accredited horticulturists would be excluded. Further, it would be necessary for all to attend the University colleges, and this, as already explained, would not be practicable, since the students would seldom possess the requisite funds, and the gardens where they were gaining their practical knowledge would frequently be far-distant from any of the colleges.

The Institute of Horticulture is a body composed of the leading horticulturists of the Dominion, together with some of the principal teachers of science in the University colleges, and scientific men of New Zealand. It is a body full of enthusiasm for horticultural education, and possesses the best knowledge of the subject which the Dominion can supply.

We consider that the New Zealand Institute of Horticulture—subject to what is recommended later—should grant a diploma in horticulture and should set up an examining Board. In this regard there is ample precedent in the cases of the Royal Horticultural and the Royal Agricultural Societies, which grant the National Diplomas of Horticulture and Agriculture respectively.

In order that the New Zealand Institute of Horticulture might function in this regard an Act of Parliament would be required. We therefore advise that a special committee* be set up by the Institute to consider the whole matter, and if the conclusion is reached that the best step in the interests of horticulture would be for the Institute to grant diplomas, then the same committee should fully investigate the financial aspects of the case. If it appeared certain that the financial obligations could be met—and this would in part depend upon the number of students sitting for the examinations—then steps should be taken for procuring an Act of Parliament. Evidently the matter is principally one of finance, and sufficient funds must be assured before taking the final step.

It is premature to draw up a provisional syllabus of the requirements for the diplomas, but a few suggestions seem required. These are as follows:—

(1.) The candidate should produce a certificate from the headmaster of the school he had attended that he had passed the highest standard with credit, and that he could write good English. We do not think that passing the Matriculation Examination is necessary, but a pass in English and agriculture (omitting dairy science) might quite well be demanded, together with the general paper in natural science.

(2.) The candidate should be employed in a botanic garden, &c., as already defined, for at least four years preceding his final examination. During those years he should keep a diary, not only detailing his daily horticultural experience but giving an account of what he had observed in the gardens, &c., of the neighbourhood, and in its natural and introduced vegetation, and telling also of the horticultural books and periodicals he had read and the horticultural shows he had attended. These diaries, we strongly recommend, should be presented yearly to the examining Board, and its report would decide if the year would count as one of the four, or if the time should be extended.

* Such a committee has since been set up, and has approved the principle of the granting of diplomas by the Institute. The committee is now further studying the matter.

(3.) The Intermediate Examination should consist of elementary chemistry, including soil-science, botany, and entomology, but all should have a more or less distinct horticultural bearing.

(4.) The Final or Professional Examination should consist of two parts, the one dealing with the principles of horticulture, which would include surveying and book-keeping, and the other with practical horticulture, which would include the identification of garden-plants and the use of a flora.

All examinations should be both written and oral, the latter to be considered the more important. Here we quote from the Regulations for the Royal Horticultural Society's examination for the N.D.H., since it exactly represents our opinion concerning examinations: "It should be remembered that the examination was designed to test first a candidate's practical knowledge, and secondly his acquaintance with theory so far as it assists garden practice. The examiners will do their best to discourage cram, to insist on practical experience. Books are only valuable when used intelligently to supplement the latter."

In addition to the young horticulturists there are the much older men of wide experience, some of whom, in part at any rate, have assisted in raising horticulture in the Dominion to its present state of efficiency, and whose work speaks for itself. We suggest that men of this calibre should receive without examination the diploma if the examining Board considers that their work has entitled them to this distinction. We would further suggest that only candidates over forty years of age come into this class. Such may make application for the diploma, stating their claims.

Candidates also who have had not less than fifteen years' practical experience might be excused the Intermediate Examination, and in the Final Examination be examined in practical horticulture only.

In all cases diplomas for these last two classes of candidates should be issued only for a limited period—say, three years after the coming into operation of the Institute's examining-powers.

For all examinations and diplomas fees should be charged, based on those to be paid for the examinations and degrees of the New Zealand University.

Graduates of any university holding any degree (including botany) equivalent to the B.Sc. degree of the New Zealand University might be admitted to the Final Examination after having had four years' practical experience as before defined.

With regard to horticultural teaching in the primary and secondary schools, provision is made for excellent horticultural teaching under the name of "Agriculture." If such teaching is carried out efficiently, and especially if the pupils are encouraged to use their powers of observation, an excellent foundation would be laid for building up the proper horticultural spirit in the people. All this lies with the teachers themselves and with the special instructors. Are these fully equipped, not only with the necessary knowledge but in realization of the importance of the subject as an essential training for all citizens? Above all, in the teaching in schools the indigenous plants of New Zealand should not be neglected. No branch of horticulture or hardly of general education is so eminently fitted to build up in the children's minds the love of their country.

SUBTERRANEAN CLOVER IN AUSTRALIA.

MR. J. W. DEEM, Instructor in Agriculture, who recently visited Australia, contributes the following notes on this subject :—

Subterranean clover is growing on extensive areas in South Australia, and is fairly well established in many parts of Victoria. None was observed by me in either New South Wales or Queensland. Various agricultural authorities spoken to in the latter States considered that it would not thrive, but this is difficult to understand seeing that white clover does exceptionally well in many localities, especially in the paspalum area on the north coast of New South Wales. However, I understand that considerable sowings are to be made this year, and the results will be interesting to watch. The Mount Barker district, in South Australia, has the credit of introducing subterranean clover into Australia, and certainly it is now the home of this plant in the Commonwealth. The district is thirty to forty miles from the sea, several hundred feet above sea-level, and has a rainfall of 30 in.

There is no doubt that subterranean clover has made a wonderful difference to the carrying-capacity of the land where it has been established, especially where top-dressing has been carried out. Its response to phosphates has been wonderful, and if top-dressing is at all systematic it quickly covers the whole surface. For a long time very little actual sowing of seed was done, farmers depending on the spread of the clover by means of stock, but now that seed is cheaper large areas are sown, seeding being at the rate of from 4 lb. to 8 lb. per acre, generally with a bushel of oats, on cultivated land; on pasture land the seed is broadcast at the rate of 1 lb. to 2 lb. per acre. Very little attempt appears to have been made to sow subterranean clover in conjunction with other clovers and grasses. However, a few farmers are now adopting this practice, and the results promise to be good. At the same time there is some danger that the subterranean clover will oust most other pasture constituents. Sowing is done in either spring or autumn, the latter for preference.

The harvesting of seed has been a difficult process in the past, but with the heavier crops obtained by the use of fertilizers the work has become much simpler. The general practice at present is to cut with a mowing-machine with a pea-tumbler attached. A yield of 300 lb. of seed per acre is considered a good crop, but up to 400 lb. has been obtained. I understand that Messrs. Howard Bros., the chief seed people of Mount Barker, have paid up to £8 per acre for the right to harvest clover-seed. Last year they saved 60 tons, and the price on the farm at the time of my visit was about 2s. 6d. per pound. For threshing, the ordinary clover-huller is used, after which the seed is put through a winnower with some proprietary attachments, the nature of which the owners do not care to disclose. I understand that at the last Melbourne Royal Show there was a cleaner shown which makes a perfect job of the work.

I was informed by farmers that in summer, when the pastures dry up, sheep will fatten on subterranean-clover seed left on the ground.

TESTING OF PUREBRED DAIRY COWS.

CERTIFICATE-OF-RECORD LIST FOR NOVEMBER AND DECEMBER.

W. M. SINGLETON, Director of the Dairy Division.

ALTHOUGH, apart from Holly Oak's Annie, no new class-leaders are included in the appended list, there is no dearth of good records, and many outstanding performances will be noted. Details of the performance of Holly Oak's Annie, owned and tested by Mr. W. T. Williams, of Pukehou, Hawke's Bay, and present Jersey champion for New Zealand, were given in a special note in last month's *Journal*, illustrated with a good photograph of this remarkable cow. In the present list her name and record will be found at the head of the mature Jersey class.

The outstanding record among the Friesians is that of the mature cow Oakwood Daisy Bell, owned and tested by Mr. R. J. Potter, of Pukerau, Southland, with 914·67 lb. butterfat. Her sire is Friesland Colantha Lad, sire of four C.O.R. daughters. Oakwood Daisy Bell was bred by Mr. Gladstone Robinson, of Gleniti, Timaru, and was purchased by Mr. Potter from the stud of Mr. W. D. Hunt, Waikiwi, at whose farm she gained a C.O.R. for 496·12 lb. fat, on a record commenced at the age of 2 years 341 days.

Among the Ayrshires, Mr. T. A. Montgomerie's Glencairn Miss Loudoun shows up very creditably with her record of 654·52 lb. butterfat, commenced at the age of 2 years 360 days. This record entitles her to second place in her class.

LIST OF RECORDS, NOVEMBER AND DECEMBER, 1925.

* Cow milked three times daily during whole lactation period. † Milked three times daily during part of period.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
JERSEYS.						
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Glyndyfrdwy Clara*	J. R. Kelly, Morrinsville	2 25	243·0	361	10,326·3	631·76
Twylish Bell	F. J. Finer, Ngutuwera	1 345	240·5	365	13,205·9	582·29
Rebel's Leona	E. J. Sultzberger, Mangatoki	1 336	240·5	365	11,238·45	578·16
Uruti Princess	W. Oxenham, Uruti	1 354	240·5	365	9,788·5	543·32
Beechland's Maid of Honour	A. Moreland and Son, Te Rapa	2 14	241·9	345	10,026·6	542·06
Kareta	F. J. Finer, Ngutuwera	1 357	240·5	365	9,031·5	532·34
Rosy Creek Wavelet†	R. S. Tuck, Waharoa	2 0	240·5	365	9,827·75	520·85
Holly Oak Doucette	W. Oxenham, Uruti	2 25	243·0	365	9,240·9	519·59
Alfalfa Daydawn*	J. R. Kelly, Morrinsville	1 327	240·5	359	8,573·6	510·71
Golden Charm	L. and J. Griffith, Weraroa	1 347	240·5	365	9,580·2	510·68
Lady Generous	F. J. Finer, Ngutuwera	1 292	240·5	365	7,901·2	510·04
Waipiko Love	C. G. C. Dermer, Waipiko	2 6	241·1	365	10,092·3	505·80
Kuku Faith	R. L. Horn, sen., Ohau	2 31	243·6	365	10,899·5	497·28
Holly Oak Maizie	Kilgour Sisters, Kiwitea	1 282	240·5	365	8,314·2	489·34
Dainty's Fawn	D. Kennedy, Morven	2 22	242·7	365	7,663·8	487·13

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*					
Junior Two-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Middlewood Rene ..	Kilgour Sisters, Kiwitea ..	2 12	241·7	365	7,866·5	485·49
Colmore Owl's Isbel ..	A. E. Phillips, Maunu ..	2 39	244·4	365	7,972·9	483·38
Roslyn Genoa Princess	J. Harris, Bombay ..	2 89	249·4	358	8,530·2	478·18
Ranui Golden Treasure	J. H. Mungavin, Ohau ..	2 33	243·8	365	9,403·1	477·09
Jerseydale Faith ..	J. Pettigrew Pihama ..	1 345	240·5	365	7,460·0	476·39
Middlewood Gladful ..	A. G. Somerville, Takapau ..	2 41	244·6	365	7,890·1	470·43
Koro Koro Sungleam	R. W. Southee, Kiwitea ..	2 28	243·3	365	7,850·4	459·72
Pecan	Boon Bros., Whakatane ..	1 329	240·5	365	8,426·0	458·22
Distinction's Maiden ..	W. H. Richardson, Lowgarth	2 51	245·6	365	8,862·3	454·35
Oaklands Princess Mary	H. C. Sampson, Hillsborough	1 361	240·5	350	6,819·1	453·52
Heatherlea Fox ..	H. J. Lancaster, Levin ..	2 48	245·3	365	8,923·7	452·35
Middlewood Daisy ..	Kilgour Sisters, Kiwitea ..	2 1	241·6	365	6,963·6	451·14
Brookley Lady ..	W. Johnson, Ngaere ..	1 362	240·5	346	6,537·7	448·30
Holly Oak Genesta ..	W. Oxenham, Uruti ..	2 18	242·3	365	7,552·6	441·41
Craigie Gift ..	P. C. Short, Lowgarth ..	2 64	246·9	365	9,283·0	438·23
Lingerie of Rosy Creek	R. S. Tuck, Waharoa ..	2 33	243·8	325	7,035·0	436·16
Orange Dale Ruby ..	W. J. Hall and Son, Matatoki	1 340	240·5	365	7,581·4	435·82
Woodstock Bargee ..	A. Banks and Son, Kiwitea ..	2 0	240·5	365	8,284·8	435·56
Oakland's Griselda ..	F. W. Cornwall, Bell Block	1 338	240·5	365	6,969·7	433·38
Rewa Sainfoin ..	W. H. Booth, Carterton ..	1 347	240·5	365	8,651·7	431·17
Jersey Dale Treasure	J. Pettigrew, Pihama ..	1 247	240·5	365	8,099·7	426·43
Jersey Farm Podgy ..	H. R. Benbow, Ormondville	2 57	246·2	365	7,353·7	425·40
Silver Sunbeam† ..	R. Weinberg, Niho Niho ..	1 359	240·5	365	6,315·6	420·21
Jersey Brae Constance†	T. Church, Te Rapa ..	2 48	245·3	339	6,861·2	419·22
Jersey Park Daphne ..	H. J. Addenbrooke, Ngaere	1 325	240·5	365	7,392·0	418·27
Noble's Dairymaid ..	S. Shalfoon, Opotiki ..	2 28	243·3	364	7,858·1	412·98
Woodstock Zany ..	A. Banks and Son, Kiwitea	1 316	240·5	365	8,723·2	408·75
Miro Meadow's Flo	A. A. Ward, Tariki ..	1 331	240·5	365	6,966·8	407·62
Jersey Farm Handsome	H. R. Benbow, Ormondville	1 322	240·5	365	6,233·1	396·03
Bronze Gleam ..	D. L. A. Astbury, Mangatoki	1 308	240·5	365	8,135·5	396·55
Springvale Golden Maid	H. C. Bishop, Brixton ..	2 18	242·3	364	7,725·3	396·46
Belvedere Nonetta ..	R. Wattam, Cambridge ..	2 53	245·8	365	6,465·6	395·50
Heatherlea Neatest ..	H. J. Lancaster, Levin ..	2 22	242·7	365	7,885·6	393·27
Ocean Fringe ..	L. Kavanagh, Waihi (Hawera)	2 38	244·3	335	7,571·3	386·59
Passadena's Lady ..	Kilgour Sisters, Kiwitea ..	2 25	243·0	357	7,862·5	385·89
Jersey Meadows Rose	H. H. Phillips, Te Rehunga	2 38	244·3	365	6,288·4	385·06
Rewa Aura	W. H. Booth, Carterton ..	2 14	241·9	365	7,496·5	382·78
Matai Nui Anthea ..	D. L. A. Astbury, Mangatoki	2 88	240·5	365	7,130·6	382·52
Sterling Cream† ..	R. Weinberg, Niho Niho ..	2 80	248·5	365	7,210·2	380·34
Murie's Finella ..	A. E. Phillips, Maunu ..	1 322	240·5	365	6,906·4	373·46
Asterias	L. Kavanagh, Waihi, Hawera	1 353	240·5	346	7,069·8	372·06
Fencourt Pearl ..	R. Wattam, Cambridge ..	1 315	240·5	365	6,562·5	371·70
Oakvale Lala ..	J. H. Street, Bell Block ..	2 50	245·5	334	6,483·2	368·26
Wotton Linnet's Linda	W. E. Pilcher, Raumati ..	2 35	244·0	365	7,213·9	366·61
Miro Meadow's Magnet	A. A. Ward, Tariki ..	1 259	240·5	342	6,822·7	365·78
Goodwood Ruby† ..	E. Griffiths, Cambridge ..	2 30	243·5	365	7,310·1	365·01
Woodstock San Toy ..	A. Banks and Son, Kiwitea	1 291	240·5	325	7,355·6	362·57
Kudos Nell	E. Harding, Woodville ..	1 362	240·5	365	6,269·2	355·76
Kuku Bonny Jean ..	R. L. Horn, sen., Ohau ..	2 0	240·5	326	6,289·2	350·77
Lynford Blue Bell ..	E. Grinlinton, Woodville ..	2 40	244·5	365	7,086·5	339·51
Jersey Holme Astral Lady	A. Buchanan, Palmerston N.	2 12	241·7	358	6,364·2	331·02
Jersey Meadows Lass	H. H. Phillips, Te Rehunga	1 271	240·5	356	5,783·6	325·13
Royden Anemone ..	H. Moreland, Newstead ..	1 345	240·5	346	6,135·5	317·04

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*					
Junior Two-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Woodstock Rosebud	A. Banks and Son, Kiwitea	1 278	240·5	309	5,607·2	304·20
Tillingdown Runa	H. O. Washbourn, Richmond	1 292	240·5	363	5,615·9	303·38
Remuera Emblem	E. H. Linnell, Midhirst	1 285	240·5	364	5,267·4	299·00
Oakland's Golden Maid	W. H. Waterhouse, Runciman	2 19	242·4	248	5,070·9	290·48
Willowbank Lady May	Boon Bros., Whakatane	2 114	251·9	256	5,058·5	284·73
Crofton Viola	A. J. Luxton, Omata	2 10	241·5	226	4,322·1	284·51
Remuera Jazz	E. H. Linnell, Midhirst	1 322	240·5	325	5,364·5	275·97
Cordelia	C. Stevens, Maungatapere	1 361	240·5	236	5,615·8	274·39
Trewithen Twylight	D. Kennedy, Morven	2 66	247·1	281	4,896·4	272·93
Dot's Charm	R. E. Clements, Awakino Point	1 347	240·5	365	4,883·4	270·40
Streamvale Topsy	T. Kenealy, Remuera	1 77	240·5	337	4,313·8	255·65
Tongahoe Butterfly	R. Hicks, Hawera	2 12	241·7	365	6,210·2	253·18
Kudos Patricia	E. Harding, Woodville	2 39	244·4	365	5,556·9	252·21
Remuera Choice	E. H. Linnell, Midhirst	2 51	245·6	302	4,480·4	247·29
Senior Two-year-old.						
Beechland's Preference	A. Moreland and Son, Te Rapa	2 322	272·7	365	12,010·2	655·49
Korokoro Empress	R. W. Southee, Kiwitea	2 316	272·1	365	9,167·6	588·52
Alfalfa Dairymaid	A. E. Phillips, Maunu	2 109	251·4	365	8,826·9	534·52
Silver's Fawn	W. S. Carter, Palmerston N.	2 286	269·1	365	9,148·5	520·77
Makara Queen	R. Haylock, Ngaere	2 345	275·0	365	8,388·0	506·50
Lincoln Lady	Dyer and McGuiness, Carterton	2 335	274·0	339	8,265·7	504·54
Holly Oak Delight	T. H. Verry, Pahiatua	2 186	259·1	365	8,683·4	450·56
Katykid	R. Haylock, Ngaere	2 329	273·4	365	7,663·3	439·35
Tinsel's Lady Clarabelle†	E. Hofmann, Katikati	2 351	275·6	365	8,838·9	435·97
Rosemont Lady Irene	E. L. Roose, Pukekohe	2 347	275·2	365	7,656·0	418·47
Matai Nui Diadem	D. L. A. Astbury, Mangatoki	2 307	271·2	365	7,008·0	408·90
Amuri Beauty	J. Blair, Waipuku	2 350	275·5	326	4,976·7	278·31
Holly Oak Kewpie	A. J. Hale, Hillsborough	2 217	262·2	209	4,362·7	272·09
Three-year-old.						
Onaero Gipsy Queen	J. O'Donnell, Bunnythorpe	3 327	309·7	353	12,947·2	666·51
Koro Koro Beryl	R. W. Southee, Kiwitea	3 355	312·5	365	11,867·8	658·38
Oakvale Violet	J. H. Street, Bell Block	3 271	304·1	365	10,045·3	647·04
Cowslip's Dimple	W. T. Williams, Pukehou	3 59	282·9	365	9,791·7	555·99
Woodland's Golden Gem	H. C. Sampson, Hillsborough	3 37	280·7	365	9,289·9	545·17
Richwood Maiden	A. E. Phillips, Maunu	3 35	280·5	365	11,034·8	542·49
Holly Oak's Sage Queen	F. Jennings, Mauriceville	3 205	297·5	365	8,757·4	541·68
Honeyfield Melia	J. Poletti, Bell Block	3 144	291·4	365	8,267·2	541·67
Onaero Ladybird	Boon Bros., Whakatane	3 25	279·5	316	9,358·5	506·30
Majesty's Swan's Lady	J. P. Bolland, Taupaki	3 208	297·8	365	10,311·1	491·97
Jersey Brae Lass†	T. Church, Te Rapa	3 339	310·9	334	8,251·3	491·61
Ohio Golden Tinsel	W. T. Williams, Pukehou	3 25	279·5	365	8,728·2	482·42
Willow Bank Evelyn	Boon Bros., Whakatane	3 21	279·1	332	10,236·0	470·95
Springbank Duchess Ella	E. S. Holdaway, Ballance	3 15	278·5	365	9,153·1	455·25
Creamlands Cissie	T. H. Verry, Pahiatua	3 291	306·1	339	11,694·2	437·26
Brookley Tessie	W. Johnson, Ngaere	3 46	281·6	328	7,677·4	382·52
Cloverlea Duchess	Truby King, Stratford	3 11	278·1	302	6,762·3	311·69
Royton Silk	H. Moreland, Newstead	3 122	289·2	313	5,312·9	305·86
Waipuna Petal	H. C. Wallace, Tamahere	3 37	280·7	300	5,185·9	288·60

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Grl.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*					
Four-year-old.		Yrs. dys.	lb.		lb.	lb.
Raithwaite Belle ..	F. J. Finer, Ngutuwera ..	4 23	315·8	365	13,731·7	704·09
Miro Meadow's Floria	R. W. Southee, Kiwitea ..	4 319	345·4	365	11,179·2	694·95
Maori Kit	H. B. Lepper, Lepperton ..	4 363	349·8	365	11,853·2	665·27
Koro Koro's K.C. Belle	R. W. Southee, Kiwitea ..	4 291	342·6	365	10,742·6	658·33
Crofton's Tiny ..	A. J. Luxton, Omata ..	4 292	342·7	365	11,147·5	613·64
Ivondale's Pretty ..	P. J. Petersen, Brixton ..	4 298	343·3	365	12,333·5	601·87
Woodstock Windflower	A. Banks and Son, Kiwitea	4 8	314·3	365	13,019·4	601·83
Trewithen Rose ..	J. Klenner, Kaimata ..	4 51	318·6	360	8,888·0	573·04
Meadowvale Doreen	E. O'Sullivan and Sons, Cardiff	4 315	345·0	365	11,053·9	572·91
Trewithen Floss ..	H. J. Lancaster, Glen Oroua	4 35	317·0	365	8,555·9	519·22
Rambler's Agatha ..	J. Mitchell, Hopelands ..	4 52	318·7	365	8,574·1	467·89
Gaytime	F. S. Veale, Cambridge ..	4 14	314·9	364	7,552·6	462·90
Jersey Meadow's Best	W. E. Pilcher, Raumati ..	4 53	318·8	313	5,477·8	337·76
Mature.						
Holly Oak's Annie* ..	W. T. Williams, Pukehou ..	5 9	350·0	365	18,522·7	1056·49
Woodstock's Fairy ..	A. Banks and Son, Kiwitea	5 354	350·0	365	14,940·1	835·70
Ivondale's Carnation†	P. J. Petersen, Brixton ..	9 1	350·0	334	13,683·7	738·85
Qui Vive	L. and J. Griffith, Weraroa	5 3	350·0	365	12,313·7	715·55
Countessa	A. J. Luxton, Omata ..	5 347	350·0	365	12,306·6	700·74
Oakden Gertie ..	S. J. Hollard, Rowan ..	5 343	350·0	365	11,011·0	630·91
Maori Venus ..	H. B. Lepper, Lepperton ..	6 16	350·0	365	10,193·7	627·69
Pilot's Jewel ..	H. C. Sampson, Hillsborough	5 325	350·0	365	11,774·6	613·46
Mabel's Chase† ..	E. Hofmann, Katikati ..	9 294	350·0	356	10,880·1	605·63
Meadowvale War Baby	E. O'Sullivan and Sons, Cardiff	5 337	350·0	365	9,535·4	601·03
Kahuwera's Enid's Hope	J. V. Mortensen, Pio Pio ..	5 302	350·0	365	9,217·8	599·06
Willow Bank Tester ..	W. Johnson, Ngaere ..	5 21	350·0	325	12,487·2	590·36
Fox's Freda† ..	E. Griffiths, Cambridge ..	8 344	350·0	347	10,967·3	587·05
Lizette's Masie ..	W. Oxenham, Uruti ..	8 23	350·0	365	12,108·7	585·27
Sweet Molina ..	A. J. Luxton, Omata ..	8 35	350·0	364	10,173·7	575·46
Gossiper	E. A. Alcock, Waihou ..	5 327	350·0	365	11,127·8	572·42
Feoni	A. and J. O'Donnell, Hawera	7 312	350·0	365	11,432·8	570·13
Floss of O.K. ..	J. V. Mortensen, Pio Pio ..	7 200	350·0	359	8,940·8	566·01
Kuku's Blossom ..	R. L. Horn, sen., Ohau ..	5 328	350·0	364	11,255·4	564·10
Maori Tit Bit ..	H. B. Lepper, Lepperton ..	5 88	350·0	352	9,007·1	560·72
Primula of Jersey Holme	E. L. Roose, Pukekohe ..	7 8	350·0	365	10,834·9	557·78
Jersey Brae's Countess	T. Church, Te Rapa ..	6 266	350·0	365	8,796·4	556·93
Jersey Lea Model Rose	S. Bowker, Ihakara ..	9 79	350·0	365	10,640·5	556·39
Fernaig Diana ..	C. G. Aickin, Woodville ..	6 168	350·0	365	10,427·1	556·13
Harmony Girl ..	A. J. Luxton, Omata ..	5 270	350·0	365	8,939·0	551·43
Beechland's Milana ..	A. Moreland and Son, Te Rapa	5 22	350·0	296	9,179·5	541·84
Lily's Perfection ..	E. J. Sultzberger, Mangatoki	5 3	350·0	348	10,284·8	538·20
Rewa Broom ..	Dyer and McGuiness, Carterton	7 21	350·0	308	10,664·8	533·62
Waipiko Joletta ..	C. G. C. Dermer, Waipiko ..	5 308	350·0	365	9,763·1	532·63
Gypsy Gold ..	J. H. Mungavin, Ohau ..	6 352	350·0	365	10,392·0	513·76
Oakdale's Lass ..	J. Poletti, Bell Block ..	7 330	350·0	299	7,814·6	504·46
Emerald Hill's Violet	E. J. Adams, Puni ..	6 167	350·0	340	9,628·7	503·61
Meadowvale Sundance	E. O'Sullivan and Sons, Cardiff	6 19	350·0	304	8,451·3	495·33
Orange Dale's Olga ..	W. J. Hall and Son, Matatoki	5 58	350·0	264	8,746·0	493·99
Coronet	D. L. A. Astbury, Mangatoki	6 236	350·0	347	9,021·8	493·89

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
JERSEYS—*continued.*						
Mature—continued.		Yrs. dys.	lb.		lb.	lb.
Gowanbrae K.C. Topsy	Miss M. R. E. Saxton, Stoke	5 22	350·0	305	8,177·4	488·37
Waipuna's Ivy ..	H. C. Wallace, Tamahere ..	6 26	350·0	365	9,857·2	471·76
Bell Block Fancy ..	A. R. Gudopp, New Plymouth	6 62	350·0	355	8,771·1	471·49
Jersey Brae's Necklace†	J. T. Entwisle, Cambridge ..	7 8	350·0	300	8,012·8	466·29
Willow Bank Wonder Girl	H. J. Addenbrooke, Ngaere	5 6	350·0	365	8,528·25	461·70
Richwood Rose ..	C. G. Aickin, Woodhill ..	6 132	350·0	365	8,791·9	459·60
Waipuna's Peace ..	H. C. Wallace, Tamahere ..	5 53	350·0	323	7,678·2	450·14
Prim's Golden Lassie	W. J. Freeth, Waitara ..	6 224	350·0	328	7,744·8	449·45
Majesty's Orange Fox	F. S. Veale, Cambridge ..	6 30	350·0	328	9,775·5	446·56
Roslyn Cherry ..	J. Harris, Bombay ..	10 47	350·0	365	8,128·6	444·37
Belle's Beauty ..	W. S. Carter, Palmerston N.	5 270	350·0	365	7,921·3	441·30
Jersey Brae's Sea Shell	T. Church, Te Rapa ..	5 15	350·0	317	8,525·8	430·07
Orange Dale's Butter Lass	R. K. Garland, Okauia ..	5 359	350·0	327	7,527·7	426·62
Motu	J. A. Dearlove, Te Aroha ..	5 6	350·0	284	7,018·55	420·91
Mauriaena Veronica ..	C. G. Aickin, Woodhill ..	6 338	350·0	353	7,824·4	410·32
Meadowvale Sheila ..	E. O'Sullivan and Sons, Cardiff	5 342	350·0	283	6,465·5	409·96
Willow Bank Duchess	W. Johnson, Ngaere ..	5 52	350·0	316	7,145·8	402·22
Grafton Christmas Gift	S. J. Robinson, Hinuera ..	5 293	350·0	306	7,953·3	394·59
Lynwood's Lady ..	H. G. Lever, Tauranga ..	8 352	350·0	352	8,255·4	387·46
Springbank Lucky Lass	E. S. Holdaway, Ballance ..	5 55	350·0	285	8,095·3	383·04
Prim's Countess ..	C. G. Aickin, Woodhill ..	5 343	350·0	342	6,896·1	358·84
Fencourt Adora ..	H. Moreland, Newstead ..	6 268	350·0	365	8,479·9	358·56
FRIESIANS.						
Junior Two-year-old.						
Dominion Woodcrest Domino	Central Development Farm, Weraroa	1 324	240·5	365	11,996·2	444·84
Dominion Domino Colantha	Central Development Farm, Weraroa	1 346	240·5	354	11,038·9	427·07
Dominion Piebe Johanna	Central Development Farm, Weraroa	1 350	240·5	365	10,492·1	414·31
Dominion Johanna Colantha	Central Development Farm, Weraroa	1 343	240·5	353	10,241·3	373·73
Dominion Jessie Kruger	Central Development Farm, Weraroa	1 334	240·5	365	9,688·4	357·36
Rouble Pieterje Valdessa*	John Court, Ltd., Auckland	1 274	240·5	328	9,003·1	346·36
Brookdale Lady of Fencourt	J. H. Jamieson, Cambridge	1 341	240·5	365	9,768·6	345·87
Dominion Woodcrest of Weraroa	Central Development Farm, Weraroa	1 294	240·5	311	10,983·0	332·13
Dominion Domino Fobes Beets	Central Development Farm, Weraroa	1 351	240·5	335	8,950·3	329·86
Senior Two-year-old.						
Ryvington Pontiac Stately†	A. M. Hodgson, Tamahere ..	2 275	268·0	365	14,770·3	536·99
Milkmaid Colantha Woodcrest*	R. Colee, Greendale ..	2 341	274·6	365	15,070·8	534·57
Dinah of Tikorangi† ..	R. S. Tuck, Waharoa ..	2 327	273·2	365	14,813·8	514·08
Cordyline Johanna Cremona†	A. M. Hodgson, Tamahere	2 346	275·1	365	11,447·4	414·63

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	FRIESIANS—*continued.*					
Junior Three-year-old.		Yrs. dys.	lb.		lb.	lb.
Brookfield Betty Paxton†	Piri Land Co., Auckland ..	3 22	279·2	365	12,522·9	530·45
Fencourt Arcadia ..	J. H. Jamieson, Fencourt ..	3 41	281·1	353	11,865·3	407·06
Ellerlea Colantha Posch*	A. C. M. Finlayson, Kamo	3 65	283·5	200	10,510·0	374·26
Senior Three-year-old.						
Dominion Krugersdorp	Central Development Farm, Weraroa	3 313	308·3	365	13,578·5	470·07
Fairlea Friesia Mercena†	L. E. Allan, Putaruru ..	3 329	309·9	309	10,469·8	450·16
Junior Four-year-old.						
May Pontiac Mooie*	John Court, Ltd., Auckland	4 103	323·8	355	19,036·7	662·75
Livingstone Lady Klassje	W. J. Eames, Hunterville	4 14	314·9	341	12,134·6	412·59
Senior Four-year-old.						
Fairmont Johanna Fayne*	James Hart, Tatuanui ..	4 272	340·7	365	18,089·8	649·08
Mature.						
Oakwood Daisy Bell*	R. J. Potter, Pukerau ..	8 255	350·0	365	22,893·5	914·67
Bainfield 27* ..	C. H. Potter, Pukerau ..	6 351	350·0	327	22,775·9	775·00
Westmere Pietje Fobes*	R. A. Cameron, Paraparaumu	5 290	350·0	365	22,410·7	697·22

NETTIE OLLIE KORNDYKE DE KOL (JOHN COURT, LTD., AUCKLAND).

C.O.R., 1925, in Friesian junior two-year-old class: 17,874·9 lb. milk, 609·8 lb. butterfat.

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	FRIESIANS—*continued.*					
Mature—continued.		Yrs. dys.	lb.		lb.	lb.
Inka Segis Pearl* ..	Matangi Friesian Farm Company, Matangi	7 64	350·0	320	16,571·1	621·99
Dominion Corona† ..	R. A. Cameron, Paraparaumu	6 362	350·0	365	18,615·8	608·31
Dominion Jessie Beets	Central Development Farm, Weraroa	6 324	350·0	362	18,234·7	603·96
Milkmaid Johanna* ..	C. W. Baldwin and Son, Ngatoro	7 57	350·0	272	16,506·8	571·65
Princess Johanna Korndyke 2nd*	R. Colee, Greendale ..	5 350	350·0	365	16,898·4	521·05
Colinton Kittanora Inka*	R. Colee, Greendale ..	6 17	350·0	347	14,633·4	502·38
Carlowrie Belle* ..	R. K. Macdonald, Edendale	6 68	350·0	320	13,833·9	446·89
Bainfield 31† ..	Waitemata Stud Farm, Hobsonville	6 362	350·0	350	12,645·4	429·44
	MILKING SHORTHORNS.					
Junior Two-year-old.						
Glenthorpe Lady 2nd†	A. J. Melville, Buckland ..	2 82	248·7	365	11,780·9	481·09
Pukekite Queen 2nd†	R. King, Buckland ..	2 35	244·0	319	7,978·2	353·10
Senior Three-year-old.						
Willow Banks Sunrise†	A. J. Melville, Buckland ..	3 361	313·1	295	10,545·7	494·52
Senior Four-year-old.						
Glenthorpe Countess 2nd†	A. J. Melville, Buckland ..	4 349	348·4	360	12,081·1	498·11
Mature.						
Riverdale Banker 2nd	T. W. Wardlaw, Waimana	..	350·0	339	16,016·4	610·91
	AYRSHIRES.					
Two-year-old.						
Glencairn Miss Loudoun†	A. Montgomerie, Kauwhata	2 360	276·5	365	16,835·3	654·52
Maesgwyn Lilac† ..	C. M. Williams, Ohoka ..	2 2	240·7	365	10,482·2	431·68
Three-year-old.						
Braeside Avril ..	Robertson and Blackley, New Plymouth	3 5	277·5	364	7,850·4	320·65
Four-year-old.						
Dimple of Edendale ..	W. Hall, Lepperton ..	4 346	348·1	365	15,232·4	628·58
	RED POLLS.					
Two-year-old.						
Dominion Louvain ..	Central Development Farm, Weraroa	2 294	269·9	365	7,136·7	410·62
Dominion Darling ..	Central Development Farm, Weraroa	1 325	240·5	350	6,665·9	329·59
Dominion Cuba ..	Central Development Farm, Weraroa	1 312	240·5	324	6,411·7	254·35

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	Second-class Certificates.					
	Jerseys.					
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Woodstock Flaunt ..	A. Banks and Son, Kiwitea	2 4	240·9	365	8,849·7	520·98
Penrose Superior ..	J. B. Clemow, Stratford ..	1 352	240·5	365	8,435·6	463·49
Senior Two-year-old.						
Betty Kilcoy ..	C. Stevens, Maungatapere ..	2 342	274·7	223	6,648·7	298·33
Three-year-old.						
Holly Oak Peeress ..	A. J. Miller, Uruti ..	3 320	309·0	365	10,611·3	623·24
Vibrona's Fancy ..	J. R. Colson, Waihou ..	3 8	277·8	365	7,830·6	487·82
Four-year-old.						
Charity's Sweet ..	J. H. Street, Bell Block ..	4 278	341·3	220	7,710·0	391·52
Mature.						
Darling Downs Pride	J. H. Street, Bell Block ..	5 342	350·0	365	9,384·7	527·06
Golden Gracey ..	A. Hazelton, Waihou ..	7 314	350·0	364	7,315·7	472·13
Gowanbrae K.C. Rose	M. R. E. Saxton, Stoke ..	5 4	350·0	365	7,862·9	457·25
	Friesians.					
Junior Two-year-old.						
Ada Pietertje of Fencourt	J. H. Jamieson, Fencourt ..	2 13	241·8	365	12,471·8	405·73
Senior Two-year-old.						
Ryvington Pontiac Holly	A. M. Hodgson, Tamahere ..	2 349	275·4	351	10,793·1	410·41

THE BEET-SUGAR INDUSTRY IN VICTORIA.

THE Maffra district of Victoria, where the beet-sugar industry of that State is located, was visited recently by Mr. J. W. Deem, Instructor in Agriculture, who makes the following brief observations :—

This industry appears to be doing much better now, and the Maffra factory has shown a good profit during the past two seasons. Several of the local farmers grow upwards of 100 acres of sugar-beet. The seed is sown with a light coulter drill at the rate of 12 lb. to 14 lb. per acre, in drills 18 in. apart, the average drill sowing four rows at a time. Seed is imported by the factory and retailed at cost price, which for the past year or two has worked out at 1s. per pound. Most growers use fertilizers, chiefly superphosphate, at from 2 cwt. to 4 cwt. per acre. Two-thirds of this is drilled into the ground during the preparation, and the balance sown with the seed. There is at present a tendency to discontinue rolling before drilling, and to roll when the seed is through the ground. The beets are hand-thinned to about 12 in. in the drills. Intercultivation is carried out by a four-row cultivator of the Planet Jr. type. A yield of 20 tons is considered a good crop, and the beets were worth 40s. per ton at the factory last year. The roots are lifted by machinery and topped in the field. When these tops dry a little they make splendid sheep-feed, and up to twenty sheep per acre have been fattened on them. After the sugar has been extracted, the pulp is stored in a large silo and sold to farmers at from 1s. to 5s. per ton.

SEASONAL NOTES.

THE FARM.

CATCH-CROPPING FOR GREEN FEED.

OWING to the dry weather experienced this season in many districts most farmers will be anxious to produce green-feed crops as soon as possible. Provided the land is ready and there is sufficient moisture in the soil to cause germination, the sowing of cereals or mixtures of cereals and tares may be carried out during the coming month. If feed is urgently required, barley will give the earliest result; the Black Skinless variety is usually the quickest, and provides most feed in its early stages. No barley should be allowed to grow rank for green-feeding purposes. For late autumn and winter use, Algerian oats or a mixture of half oats and half barley will be found suitable generally. If the land is inclined to be sour a mixture of one-third each of oats, barley, and rye-corn has much to recommend it. Where the field is to be grazed right through the winter it often pays to sow 8 lb. or 10 lb. per acre of crimson clover with the cereal. This provides good grazing in the spring, and allows a good residue to be ploughed under. If the crop is to be carried through for hay or ensilage, mixtures of 2 bushels oats and 1 bushel tares or 2 bushels oats and 1 bushel Italian or Western Wolths rye-grass per acre, plus 3 lb. or 4 lb. red clover, are excellent mixtures. The addition of red clover to the latter mixture provides good stubble grazing or material to be turned under for green-manuring.

Under Canterbury conditions oat and oat-and-tare stubble can now be worked quickly and sown in Cape or Black Skinless barley at the rate of 2 bushels per acre, with 1 cwt. super. These barleys are very useful in Canterbury, and grow so quickly that they can often be fed off in from four to eight weeks after sowing. If late autumn or early winter feed is wanted, Gartons or any white oat may be used. Algerians are especially useful on the Plains and those places where turnips are difficult to grow. Should the turnip crop have failed from any cause, Algerian oats can be sown now and fed by the ewes about August. The stubble of oats and oats and vetches can be worked and put down in Italian or Western Wolths rye-grass so as to provide spring feed. February-sown Western Wolths is one of the most valuable crops for the Canterbury sheep-farmer, for, in addition to feeding, a summer crop of seed can often be obtained. It sometimes happens that a crop of oats has shaken badly at harvest, and if this land is skimmed and left a good shower of rain will result in some very useful autumn and winter feed.

CEREAL HARVEST NOTES.

February is the usual harvest month for white crops in Southland and South Otago. The oat crop in many parts of these districts will be ready for cutting by the beginning of the month. Cutting should

commence when there is a considerable amount of green tinge on the glumes, with the grain fully developed, as oats ripen considerably when standing in the stook, and any loss which may occur from cutting on the green side is practically negligible when compared with that from shedding owing to overripeness.

Unless harvested wheat is in very good condition, and the weather settled, it pays to stack it, and leave it in stack from six to eight weeks, so as to allow the grain to harden up after the sweat. If the crop has been stook-threshed too much care cannot be exercised in covering the stack of grain-sacks on top and at sides with straw and tarpaulin until removed to more permanent storage.

SOWING OF PERMANENT PASTURE.

There is considerable diversity of opinion on the relative merits of autumn and spring sowing of permanent pasture, and much can be said on both sides. Sometimes a poor autumn take is a result of late sowing, or the particular land may lie too wet and cold during winter. In such cases the young plants develop poorly, and the spaces between become filled with weeds. Here spring sowing would be preferable. On the other hand, a spring sowing has more competition from weed-growth. The whole matter must be decided by the circumstances of each case, but whichever the season chosen the preparation should be thorough. A well-consolidated seed-bed, with sufficient shallow surface tilth to cover the seed, is the main object. A number of instances have come under notice recently where almost total failure has resulted from a deep, loose seed-bed, the only parts showing a satisfactory take being on the consolidated wheel-marks of the machine or the hoof-marks of the team.

Where it has been decided to sow autumn grass the land should be broken up as soon as possible. Grass follows better after some fed-off crop, such as rape, millet, kale, or peas. If possible it should not be sown after a cereal crop, owing to the danger of grass-grub and the depleted fertility of the soil. While it is not good practice to sow stubble land to pasture, on many farms this cannot be avoided. Where such is necessary the land should be ploughed early and allowed to lie up to the weather, so as to destroy weeds, allow the stubble to rot, and give the soil the benefit of the sun. Grass sown after a cereal crop should get a liberal dressing of fertilizer—not less than 2 cwt. per acre.

LUCERNE.

Young crops of lucerne sown about the end of November and in December should be ready for their first cut in February. It is very important that this cutting should not be made too soon. Unless the lucerne is being smothered with weeds, or there is a heavy growth of weeds threatening to ripen seeds, the first cut should be delayed until the new growth is coming away from the crowns. About this time a fair number of the plants will be showing in bloom and the leaves will be dropping. Too early cutting of young lucerne retards root-growth. If weather conditions are suitable the stand should be given a light cultivation with the tine harrows or light cultivator after the crop has been removed.

February is a good month for destroying grass and weeds on old lucerne stands. Where necessary this work should be carried out by

means of a cultivator fitted with suitable teeth. If other implements are available, disks should not be used for summer cultivation.

Top-dressing of lucerne should be done in the autumn rather than in the spring, as in the former season the manure is less likely to encourage weeds. If the soil on which the lucerne is growing is either naturally rich in lime, or if lime has been applied to the stand, it is safe to conclude that superphosphate, at the rate of 2 cwt. per acre, will be a suitable top-dressing.

In Central Otago many irrigators will be sowing lucerne, and emphasis is laid on the fact that the seed-bed must be thoroughly prepared. The seed should be sown broadcast or in drills at the rate of 15 lb. per acre, and this can be done either through the hurdy-gurdy or by mixing the seed with finely ground rock phosphate and sowing it through a grain-drill or an ordinary seed-drill. Previous to sowing, the ground must be deeply ploughed, disked and cross-disked, harrowed, and then rolled with a Cambridge roller. A common mistake is sowing too deeply. A light brush harrow, or one made from strips of wire-netting laced together and weighted at the end with bolts, is probably the most satisfactory for covering the seed. On no account should the ordinary tine harrows be used, as they bury the seed too deep. It is important to remember that sowing should follow irrigation, and not *vice versa*, otherwise the ground will be left in a cold, damp condition, unsuitable for seed-germination.

FEEDING-POINTS.

Where forage crops are available, supplementary feeding of dairy cows should be commenced before the grass pastures lose their succulence. It is advisable to mix these forages as much as possible, so as to balance the ration. Maize and lucerne or maize and peas go well together; or, if maize, lucerne, and soft turnips are available, it is good practice to feed the maize or lucerne, or both, in the evening, and the soft turnips in the morning. Soft turnips carted out one day and fed the following morning are much better from the point of view of the quality of the milk than if fed straight from the field. If other feed is available, 60 lb. of soft turnips per cow per day should be the maximum allowance.

On mixed farms kale crops which have been fed once may be shut up, and the crust broken by cultivation between the rows By this means a second growth is generally obtained, which can be used to flush the ewes before tupping. At the end of April the crop can be cultivated again and shut up for the winter. The feed is useful in spring both for hoggets getting their teeth and for ewes in lamb.

A good many farmers now grow peas for lamb-fattening, and inquiries have been received as to the best time to stock the crop. This is just when the main portion of the peas are firm and turning colour in the pods. If stocked earlier the lambs do not take to them readily, and there is considerable waste. If dry weather prevails practically every pea will be picked off the ground. Lambs should not be confined to peas for a start, as they require a few days to get accustomed to them, and during this period they should have access to other feed. After about a week the peas are eaten readily, and the necessity for other fodder is not so

great. However, lambs fattening on peas will always do better if they have a run-off, even if it is in a bare grass-paddock. If possible, they should also be provided with good, clean drinking-water.

SUMMER TILLAGE.

The value of early skimming or sunshine cultivating is inestimable, whether the land be ploughed out of lea or stubble, and whether the cultivation be for autumn grassing, autumn-sown cereals, catch-crops, or winter fallow. Not only does such tillage ensure a good bottom for the seed-bed, but it conserves moisture, and more especially kills weeds. In Canterbury the hot sun and north-west winds of February are of greatest assistance in eradicating twitch. Frequent skimming or cultivation before the final deep ploughing is the best method of dealing with twitch. Hence it will pay to keep the team or tractor going as hard as other operations will allow.

MISCELLANEOUS.

The intercultivation of root crops should be kept going as long as possible. In this way weeds are kept in check, the soil is aerated, and moisture conserved.

Preparation should be made for saving seed from the main potato crops. Only those tubers free from disease should be selected, and, although the storage of immature seed is not always easy, such seed usually gives the best results. Medium seed about the size of a hen's egg is generally the most suitable.

In Marlborough red-clover stands which were cut for hay in November or December have come away again, and owing to the very dry weather experienced have run to head, the growth still being stunted. The best practice with such stands is to feed them down or mow them, so that when rain comes there is a chance of further growth. Although it will now be too late for a seed crop, the growth of autumn feed will be highly valuable both for sheep and cattle.

Any surplus crops of green cereals, maize, clover, lucerne, or grass growth may still be converted into ensilage, where not less than 25 to 30 tons of material is available. Well-made ensilage, it may again be repeated, is a valuable stand by for the dairy-farmer, and more use should be made of this means of utilizing surplus fodder to tide over periods of shortage.

Clearing of noxious weeds should be continued where necessary. Californian-thistle cutting should be carried out before the seeds are broadcasted by the winds. Second growth of ragwort will also require attention as regards the flower-heads.

—*Fields Division.*

THE ORCHARD.

SPRAY-STAINS.

In a general way there is very little to add to last month's remarks with regard to spraying for the various pests and diseases, but growers are advised to exercise the greatest care in the application of future sprays, with a view to reducing spray-stains to a minimum.

It is not suggested that growers should cease using arsenate of lead for the control of codlin-moth and leaf-roller. These pests must be prevented, and we cannot risk numerous codlin grubs and leaf-roller caterpillars hatching after the fruit is packed, which would seriously interfere with the quality of our pack. Spray-stains can be avoided to a great extent by using the arsenate of lead alone with a spreader at the latest application prior to picking. The addition of lime in excessive quantities gives the fruit a white appearance, and lime-sulphur and Black Leaf 40 in combination with arsenate of lead often gives the fruit a dirty appearance.

While on the subject of spray-stains it is opportune to draw attention to the unsightly appearance of apples when the apple leaf-hopper is allowed to become prevalent. The dry weather that has been experienced is very favourable to this pest; Black Leaf 40, at 1–800, should be applied at short intervals if the insects are in evidence.

FRUIT EXPORT.

Early February will see the commencement of the export season with Gravenstein, Willie Sharp, and Worcester apples. Every care must be taken to see that immature fruit is not shipped, but the two first-named varieties must be picked as soon as the leaf-green colour has faded and the straw colour begins to develop. In these early varieties the interval between export maturity and local-market maturity is very short. As regards Worcester, last season's experience seems to point to the necessity of a little more maturity to prevent shrivelling. Cox's Orange will follow, and a good striped appearance with a changing colour is the best guide as to picking. In Dunn's a perceptible change in the ground-colour, and if possible a slight tinge of colour on the cheek, is a good indication of readiness for export. The reports from London last season were very favourable as regards the maturity on arrival, and this should be a good guide for the coming season.

In the matter of packing, the best advice is to pack a full case; an overfull case means bruising before the case leaves the shed, while a loose one means bruised fruit by the time it reaches its destination. Excessive bulge should be avoided; give just enough to ensure sufficient tightness to prevent rattling. Keep the size uniform; $\frac{1}{4}$ in. allowed under the regulations is quite sufficient to ensure good packing, and a greater variation is not acceptable to buyers. Grade carefully according to the standards defined; unsightly blemishes, although they may not exceed 5 per cent., are not desirable. Appearance goes a long way in selling any article, and this should be kept in mind when packing for export.

MISCELLANEOUS WORK.

Budding can still be proceeded with; just after rain is a good time, when fresh impetus is given to the sap-flow.

Remember that insect and fungus pests are carried over for the next season by rotting fruit; therefore clean up and destroy all grubby apples and pears and fruit affected with brown-rot, &c.

If cultivation is done for the season, put the tools away under cover and grease all shifting parts.

There is still time to put in a green crop if the land is in order. A better growth will be secured by the addition of manure; phosphates and lime applied now will not be lost, and, if available, do not hesitate to put them into the land.

A little more time at thinning overloaded and weakly trees will ensure a more marketable product and give the tree a better chance.

Clean rubbishy growth from under the trees, even if deep hoeing is not convenient. Such growth affords cover for grubs, beetles, earwigs, leaf-hoppers, &c.

—J. H. Thorp, Orchard Instructor, Nelson.

CITRUS-CULTURE.

Continued cultivation is the main work for the coming month in the grove. With the prolonged dry weather experienced trees will be considerably retarded and suffer a varying amount of foliage-loss according to moisture available. Keeping the surface soil well stirred is the first essential, but the destruction of all weeds is very necessary, as much moisture escapes from the soil in growths of this sort.

It is good practice to apply a mulch at the present time. If stable manure is available a good dressing should be spread over the soil under the trees, taking care not to pile the material up round the trunk of the tree, as bark-injury is caused by contact with fresh manure. Straw, hay, or any available litter will also serve the purpose, though these materials would not be of such value when turned under later.

As a general rule irrigation is not necessary in the citrus-groves of this country, but there are occasions when it could be resorted to with advantage. There are generally to be found odd trees so situated as to suffer very materially during dry weather, but a good soaking with water when the trees are drooping will often save defoliation and loss of crop. Such applications of water are better given in furrows, which should be levelled down after the water has soaked in. Where water is readily available the better results will well repay for the time spent in irrigation.

—W. H. Rice, Orchard Instructor, Auckland.

POULTRY-KEEPING.

POULTRY TROUBLES AND MANAGEMENT.

Almost daily I receive letters asking for advice regarding the treatment of stock, arising generally out of improper management. Seldom, however, do the writers supply the detailed information necessary for understanding the cause, much less for suggesting a remedy. To advise any one on troubles met with in the various branches of poultry-keeping is not always satisfactory even when the inquirer has fully and accurately described his case. When, however, the position is only partly set out it is practically impossible to give any advice at all. For example, the other day a correspondent asked for the cause of his hens dying, but no mention was made as to their age, nor details regarding symptoms, the food supplied, or the general conditions under which they were being kept, a knowledge

of which is necessary to arrive at a probable explanation of the difficulty.

The advice has been given in the *Journal* notes over and over again that constitutional vigour should be the first consideration in the maintenance of a healthy flock. If a strong constitution is not possessed the birds cannot be expected to lay to their maximum capacity and, what is equally important, ward off those infectious diseases which are a menace to the industry. The only safe way to fight disease is to prevent it. True, infectious disease sometimes makes its appearance in the best-managed flocks, but there is invariably a cause, either through birds being introduced from outside or to some obscure little defect in management. At times it is impossible for the keenest of poultrymen to locate the origin of troubles met with.

This emphasizes the necessity for taking every means of preventing disease becoming established. Where a fowl shows the slightest symptom of disease, perhaps through the medium of a weakly specimen from stock having a predisposition to a particular trouble, the affected bird should be promptly isolated. The next important step is to find the cause, and remove it. If the trouble is allowed to gain a good foothold it may be next to hopeless to attempt to check it; or, if it is stopped, very serious losses will have taken place.

Recently a case came under my notice where one bird was introduced to a plant suffering from a complication of diseases—chicken-pox and diphtheric roup. The necessary measures for preventing the trouble from spreading were not taken, with a result that the disease rapidly spread through the flock, and in less than six weeks over thirty (including many of the most valuable specimens) of the total flock of two hundred succumbed to the disease. This is only one case in point; many a similar one could be related. Indeed, I have in my mind several large plants where an outbreak of disease may be anticipated at any moment.

Intensive poultry-farming is a successful enterprise in this country, but the more intensive the system the greater the need for sound management and the maintenance of the most exacting conditions. Having the houses draught-proof and in a thorough sanitary condition will help matters, but this is not enough if the yards are allowed to become stale and a breeding-ground for parasitic life and disease. A thoroughly clean run, especially where young stock are concerned, is just as important as a thoroughly clean house; indeed, everything should be clean about poultry. It should never be forgotten that a bad system of management will rapidly discover a weakly-constitutioned bird and encourage the passing on of the trouble to other members of the flock.

In all but a few isolated cases the disastrous troubles of common and diphtheric roup, so prevalent during the early spring, could be seen at once to be due to weak management, disease being practically invited through bad quarters or foul runs, or by insufficient or inferior diet.

Recently where advice was sought in a serious case of infectious disease the conditions were found to be so bad that the wonder was that disease had not wiped out the flock long before. The trouble was chiefly due to the owner attempting to build up a large flock

before he had provided proper accommodation, and before he knew how to handle fowls on an economical scale, these weaknesses being accentuated by the mistaken belief that it is possible to overfeed the high-type layer.

I cannot emphasize too strongly the necessity of having the houses absolutely draught-proof, the use of alternate runs so that the birds may occasionally have a change to fresh ground, and continual warfare against vermin. Cleanliness in all things is essential; it is invariably the hall-mark of the successful poultryman. Dirty, draughty houses, low feeding, and breeding from weak stock are an invitation to disease.

CONDIMENTS.

It is surprising the number of poultry-keepers who have recently resorted to the use of condiments and stimulants as a means of promoting egg-yield and reducing the cost of the food bill. This has led to serious difficulties from ovarian troubles—protrusion of the oviduct, the production of shell-less eggs, &c., and in addition a generally reduced egg-yield. As might only be expected, such experiments have proved costly to those who have undertaken them.

It should be remembered that the power to produce eggs is an hereditary character, and to enable a bird to yield to her maximum capacity it is only necessary to maintain her in a healthy condition and to supply her with the food required for the manufacture of her product. It is true that the condiment will stimulate the egg-producing organs, but the effect is brief, and the reaction which sets in not only defeats the end but undermines the constitution, making the bird unsuitable as a breeder and a susceptible individual to every passing ailment.

If any argument is required as to the futility of condiments for consistently stimulating egg-production it is surely supplied by the high records put up at the egg-laying competitions which are established without the aid of such stimulants. The condiment is the refuge of the amateur and the bugbear of the practical man.

—F. C. Brown, Chief Poultry Instructor.

THE APIARY.

TESTING HONEY FOR RIPENESS.

BEFORE tinning off the honey the beekeeper should make certain it is ripe. Fermentation is sometimes quite a serious problem to the producer, and yearly large quantities of honey which were thought to be well ripened at extracting-time ferment, more especially when left over till the weather becomes warm. The greater part of the honey produced in New Zealand is exported, and a matter of first importance is its condition on arrival at the overseas market. Usually beekeepers experience little difficulty with low-specific-gravity honeys if care is exercised and only well-sealed combs are extracted from. However, to ensure that the honey is up to standard it should be tested with a hydrometer before being run into the tins.

When making the test the contents of the tank should be gently paddled, in order that the honey may be of the same consistency throughout. This operation is of importance, as there is always a risk of variation of the specific gravity of the honey at the bottom and top of the tank. If on testing with a Twaddel's No. 4 hydrometer the instrument does not sink below 84 a well-ripened honey is indicated. This is equal to a specific gravity of 1·42, the test being made at a temperature of 60° F. As the temperature of honey in the summer rarely sinks so low, the test may be taken at 70° or 80° by adding one point to the hydrometer-reading for each ten degrees of heat over 60°. Thus, if the hydrometer sinks to 82 at a temperature of 80°, it would register 83 if taken at 70°, and 84 if taken at 60°. To arrive at the specific gravity multiply the hydrometer-reading by 0·005. Thus $84 \times 0{\cdot}005 = 0{\cdot}420$; add 1 for the specific gravity of water, and it will equal 1·420. This method is only reliable up to a temperature of 90°.

TESTING THICK HONEY.

Sometimes the honey is so dense that the hydrometer will not sink. When such is the case, take equal parts by volume (not weight) of honey and water, mix thoroughly, test with a No. 2 Twaddel's hydrometer, and then multiply the result by 2. This will give the same result as if taken with a No. 4 instrument by the direct method. Thus, if the No. 2 instrument sinks into the honey and water to 42, this multiplied by $2 = 84$. Perhaps the quickest and simplest method for testing thick honey is to have a deep glass or beaker on which is a mark, to contain about 4 oz. of water. Fill up to the mark with water, then pour it into another vessel; now fill up to the mark with liquid honey, add the water previously measured, and mix thoroughly; then place in it the No. 2 hydrometer, note the number to which it sinks, and multiply by 10; place the decimal point before the result, and add 1. Thus, if it registers 43, $43 \times 10 = 430$; place the decimal point before the $430 = 0{\cdot}430$; to this add 1, which is the specific gravity of water, and the result will be 1·430.

SUPERSEDING QUEENS.

During the progress of the honey-flow it is wise not to overlook the work proceeding in the brood-chamber. All old and failing queens should be superseded, and queenless hives supplied with young queens. To a large extent weather conditions play an important part in the mating of the queens, and if by any chance they are not able to take a wedding flight they will develop into drone layers. As fertilization of the queen takes place in the air, good weather must prevail or the drones will not fly. Hence the necessity of overhauling the hives to note their condition.

It is highly important that all colonies should go into winter quarters headed by a vigorous mother. Too many colonies are lost by queens failing in the spring months. The activities of the queen should be such as to meet abnormal wastage, and brood-rearing should proceed, or spring dwindling will assuredly follow. A good queen will keep her brood-nest compact, and fill the combs

solid with brood from end bar to end bar, whereas failing queens scatter the brood, laying a patch of eggs here and there. When such queens are detected immediate attention should be paid to superseding them. If, as advised previously, nucleus colonies were formed for the purpose of carrying out queen-rearing during the season, the surplus queens can be utilized for doing the work. If no queens are on hand an order should be sent immediately to a recognized queen-breeder for an Italian queen, so that when introduced she may proceed with egg-laying before the winter weather approaches.

APIARY REGISTER.

There is no gainsaying the advantages to be derived from making a complete record of the individual hives in the apiary. Records thus kept enable the beekeeper to work to a system, and tend to improve apiary management. It is well-nigh impossible to conduct an apiary on commercial lines unless the beekeeper takes notes at each examination. Working in the dark with respect to the age of queens, surplus, &c., is poor policy. In the absence of books the hive-cover may be used for writing notes on. A book may be mislaid, but records made inside the cover are more in the nature of a permanent handy reference. If advisable, in the beekeeper's spare time these rough notes may be copied into a complete record-book.

TREATMENT FOR FOUL-BROOD.

No effort should be spared to treat all colonies known to be affected with foul-brood. If the work is delayed the colonies will not build up to sufficient strength to winter safely. Under no circumstances should the work be put off. Treat all infected stocks while the flow is on, and endeavour to winter none but clean colonies. There is a great risk of spreading the disease to clean colonies in the off season, as robbing is more apt to break out. "Keep your bees clean" should be the maxim of every beekeeper. Where any doubt exists as to the complete absence of disease in the apiary an excellent plan is to mark all combs with the number of the hives to which they belong, so that when extracted they may be returned to the colony from which they were taken. If this plan is followed, even if any of the hives are diseased, the risk of spreading infection by means of wet combs is considerably reduced.

—E. A. Earp, Senior Apiary Instructor.

HORTICULTURE.

VEGETABLE-GROWING.

THE winter crops will now be established in most sections, and demanding occasional cultivation to destroy weeds and promote growth. The plants may be given a little judicious encouragement in the way of small doses of nitrate of soda in showery weather. Should the season be dry the larva of the diamond-backed moth, green aphis, and thrip insects are sometimes a plague. A spray composed of arsenate of lead

and tobacco concentrate is a very effective remedy in small crops. It could be applied with a knapsack pump, but for field crops the potato-sprayer would be required.

Commercial celery crops should be planted only on drained land that is naturally moist, but it sometimes happens that a particularly dry spell is experienced at this period, in which case arrangements must be made for irrigation of the crop. The operation known as earthing-up may be performed when the plant has almost completed its growth.

A dry spell at this season is also very injurious to crops of cucumbers, marrows, melons, and pumpkins. Regarding the first two kinds of these gourds, the fruits should be gathered promptly as soon as they are of size. Not only is the flavour better, but the crop will be greatly increased.

The next crop of asparagus and rhubarb will depend for its size and quality on the growth and vigour of the plants during the autumn. To encourage this, see they do not lack water and occasional dressings of fertilizers now.

Those who have good isolated beds of asparagus might well consider the growing of high-quality seed. To do this, all cull plants, more especially those of the male type, should be heavily rogued before flowering, the seed crop following being gathered from the best female plants only. Seed of this class is in urgent demand by commercial planters.

Sowings may be made now of French beans, lettuce, spinach, and swede turnips, and towards the end of the month cabbage and cauliflower for early spring cutting.

THE TOMATO CROPS.

The outdoor tomato crop will now be in the middle of the harvest period, and housekeepers should be informed of the fact. Sauces, purees, and preserves of this popular fruit are much appreciated, and a reminder in the way of suitable advertising would avoid the annoyance of the missed opportunity, which is so common among people living in the towns.

Under glass the tomato crop is about finished, and nothing is gained by leaving the house in disorder. The old plants should be removed and burnt, and the house cleaned up. Where white-fly has been troublesome it will be necessary even to fumigate the house with cyanide gas, and in some cases repeat the operation for the destruction of insects hatched out subsequent to the first fumigation. The methods and means adopted will depend on the experience of the past season. Finish off by sowing the house down in a green cover-crop, or a crop of some kind.

SMALL-FRUITS.

In the berry-fruit sections harvesting Cape gooseberries, cleaning up raspberry and strawberry breaks, and spraying gooseberry and currant plots as required will be the chief work at the present time. Where renewals have to be made it is well to consider and plan the work now, well ahead of the time for action. In fact, where new plantations of strawberries are contemplated the preparation of the

land may be commenced, so important is it that the ground should be thoroughly cleaned before planting.

TOBACCO-GROWING.

Some of the earlier-planted tobacco crops will now be about ready for harvesting. For the pipe tobaccos grown here the usual method is to split the stalk to near the ground and cut it off at the surface; after being left on the ground for half an hour or so to wilt, ten or twelve of the stalks are threaded on a 4 ft. curing-stick and hung in the curing-shed to dry. The signs of ripeness are a paling of the green-leaf colour and a yellow mottling appearing first on the lower leaves. The plants are usually harvested when the middle leaves on the stalk show these signs. The plants must be dry, and are in best condition for harvesting in fine warm weather. When the loaded curing-sticks are hung on the tier poles in the curing-shed the method is to keep the shed closed for a while until the green colouring of the leaf turns to yellow, and as soon as this stage is reached to dry them quickly and maintain a good even bright colour. In handling, every care should be taken to avoid tearing the leaf. Leaves beaten and bruised in the wind will never make a first-class sample, and the price obtained will suffer accordingly.

—W. C. Hyde, Horticulturist.

EXPORT OF FRUIT, 1926 SEASON.

1. CONDITIONS OF GOVERNMENT GUARANTEE.

CONDITIONS for the Government guarantee on shipments of apples and pears made from New Zealand during the 1926 export season are as follows:—

1. The guarantee shall be limited to approved varieties and classes of fruit packed in compliance with the requirements of the "Extra Fancy," "Fancy," and "Good" grades, and shall be restricted to a maximum of 350,000 cases of apples and 8,500 cases of pears.

2. The Government's liability under the guarantee shall include all packing and marketing expenses which the Department of Agriculture may deem reasonable and necessary, plus 3s. 4d. per case with respect to "Extra Fancy" and "Fancy" grade apples, and 1s. 6d. per case with respect to "Good" grade; and 1d. per pound with respect to pears. No allowance to be made for cool storage unless an approved system of precooling is adopted, in which event such allowance shall not exceed 5d. per case; and, further, the insurance allowance shall not exceed that required to provide an ordinary marine-risk cover. In case of shipments to the United Kingdom no charge for selling-commission exceeding 5 per cent. will be allowed, nor will a total exceeding 1s. per case be allowed for the following overseas charges—namely, supervision, port rates, dock charges, warehousing, cartage, tolls, porterage, forwarding, and surcharges.

3. The guarantee to be limited to fruit grown and shipped (otherwise than under a f.o.b. contract) by *bona fide* fruitgrowers or fruitgrowers' co-operative societies, through the New Zealand Fruit-export Control Board or other channels approved by the Minister of Agriculture.

4. Any grower who exports any portion of his "Extra Fancy" or "Fancy" grade fruit crop outside the guarantee shall be deemed to have forfeited his right to participate in the guarantee with respect to all fruit exported during the season by him or on his behalf.

5. All fruit to qualify for the guarantee must be passed by an Inspector of the Department, and must be packed in accordance with the Export Regulations, subject to the modifications and directions set out in the appended statement entitled "Export Regulations."

6. Payment of claims under the guarantee shall be calculated on the basis of the average price received by the claimant for the whole of the "Extra Fancy," "Fancy," and "Good" grade fruit exported (otherwise than under a f.o.b. contract) on his account during the season, irrespective of markets.

7. Where, however, fruit of more than one variety and supplied by more than one grower is exported by a joint packing company or group in its own name the guarantee shall be calculated separately in respect of the whole of the fruit supplied for export by each grower, on the basis of the pool price received for each variety supplied by him with respect to each shipment; provided that the joint packing company or group shall have, not later than seven days after the fruit has been shipped from New Zealand, notified to the Director of the Horticulture Division full particulars of each grower's fruit included in each shipment.

8. The Government reserves to itself the right (*a*) to withhold the guarantee with respect to any variety of "Good" grade apples in the event of the Director of the Horticulture Division being satisfied that the grower of such apples is not shipping a reasonable proportion of "Extra Fancy" or "Fancy" grade fruits of that variety; (*b*) to limit the quantity of fruit shipped to any particular port should freight rates or market conditions, &c., be deemed unsatisfactory; (*c*) to insist on all fruit being precooled prior to shipment, if deemed necessary; (*d*) to withhold the privileges of the guarantee from all fruit shipped in vessels the storage facilities of which are held by the Department to be unsatisfactory; (*e*) to withhold the privileges of the guarantee with respect to any market in connection with which the New Zealand Fruit-export Control Board are of the opinion a satisfactory f.o.b. or c.i.f. trade is or can be established.

9. The Government reserves the right to re-examine and to withdraw any fruit from export in the event of such re-examination indicating that by reason of overmaturity or other cause inimical to the keeping-qualities of the fruit it would be inadvisable to allow such fruit to be exported. All fruit so withdrawn may be disposed of in New Zealand by the owner without reference to the guarantee, or by the Government on behalf of the owner. In the latter event the proceeds will be credited to the owner, and the transaction dealt with generally as though the fruit had been actually exported under the guarantee. But should such re-examination reveal the fact that any line of fruit, through careless or faulty packing, is decidedly below the standard required it will be deemed not to be covered by the guarantee, and the owner of such fruit may, at the option of the Minister, be held to have forfeited all right to participate in the guarantee for the remainder of the season.

2. EXPORT REGULATIONS.

The following regulations shall apply to all fruit—apples and/or pears, as the case may be—intended for export under the Government guarantee, 1926:—

GRADES AND VARIETIES.

"EXTRA FANCY" AND "FANCY" GRADES.

The standards shall be as set out in the Export Regulations of 1920, the principal requirements of which are as follows:—

Grade.	Colour.				Defects.
	Solid Red.	Partial Red.	Striped.	Yellow or Green.	
	Per Cent.	Per Cent.	Per Cent.		
Extra Fancy	75	50	33⅓	Good characteristic colour	No more than 8 per cent. of apples in case affected with slight blemish.
Fancy ..	50	25	20	Good characteristic colour	Apples not to be affected with more than 5 per cent. blemish or 5 per cent. unnatural russet.

Ten per cent. and 5 per cent. reduction in the above-mentioned colour requirements with respect to "Extra Fancy" and "Fancy" grades will be allowed in connection with fruit packed for European markets.

APPLES.

The following varieties of apples (which were accepted for export in the 1923 season), owing to their unsatisfactory carriage and out-turn, and the low prices realized in consequence of this or other unsuitable marketing characteristics, have since been omitted from the export list: Alfriston, Ballarat, Reinette du Canada, Washington.

The following have been omitted mainly on account of there being an insufficient quantity offering to warrant retention: Sharp's Late Red, Claygate Pearmain, Golden Russet, Scarlet Pearmain, Shepherd's Perfection.

The varieties marked with an asterisk in the following lists, although retained, are considered to be of little value for export purposes, and growers are advised to consider the reworking of these varieties, as well as those above mentioned, with a more suitable export variety. In the case of London Pippin the fruit must be hand graded and sized, and specially good of the variety.

APPROVED FOR EXPORT TO EUROPE.

Max. Size.	Variety.	Min. Size.	Max. Size.	Variety.	Min. Size.
	Solid Red Varieties.				
96	Baldwin*	225	110	Rokewood	240
96	Hoover*	225	96	Tasma	225
	Partial Red Varieties.				
110	Crofton	225	110	Scarlet Nonpareil ..	240
96	Delicious	225	110	Shorland Queen ..	225
110	Dougherty	255	96	Spitzenberg	225
110	John Sharp ..	225	110	Stark	225
110	Jonathan	240	110	Wagner	225
110	King David ..	240	110	Worcester Pearmain ..	225
96	Rome Beauty ..	225	110	Yates	255
	Striped Varieties.				
110	Adams Pearmain ..	225	120	Ribston Pippin ..	225
110	Allington Pippin* ..	225	110	Senator	225
120	Cox's Orange ..	255	110	Statesman	240
96	Premier	210	110	Stayman Winesap ..	210
	Yellow or Green Varieties.				
96	Boston Russet ..	225	96	London Pippin* ..	200
110	Brownlee's Russet ..	225	96	McMahon's White ..	225
110	Cleopatra	240	110	Newtown Pippin ..	240
96	Dunn's	210	96	Parlin's Beauty* ..	225
110	Golden Pippin ..	225	110	Sturmer	240
110	Grannie Smith ..	225	110	Willie Sharp ..	225
110	Gravenstein ..	225			

APPROVED FOR EXPORT TO SOUTH AMERICA.

Max. Size.	Variety.	Min. Size.	Max. Size.	Variety.	Min. Size.
	Solid Red Varieties.				
80	Baldwin	140	96	Rokewood	140
80	Hoover	140	64	Tasma	140

APPROVED FOR EXPORT TO SOUTH AMERICA—*continued.*

Max. Size.	Variety.	Min. Size.	Max. Size.	Variety.	Min. Size.
	Partial Red Varieties.				
96	Crofton	140	80	Scarlet Nonpareil ..	140
80	Delicious	140	80	Shepherd's Perfection	140
80	Dougherty	140	96	Shorland Queen ..	140
96	Jonathan	140	80	Spitzenberg	140
96	John Sharp ..	140	96	Stark	140
96	King David ..	140	96	Wagner	140
80	Rome Beauty ..	140	110	Yates	140
80	Salome	140			
	Striped Varieties.				
96	Adams Pearmain ..	140	96	Statesman	140
80	Premier	140	80	Stayman Winesap ..	140
80	Senator	140			
	Yellow or Green Varieties.				
96	Cleopatra	140	96	Sturmer	140
80	Dunn's	140			

SPECIAL CONDITIONS APPLYING TO EXPORT TO SOUTH AMERICA.

The modifications regarding colour standards allowed for European markets will not apply to apples for the South American market.

Grades: No fruit below the standard of "Fancy" grade as defined in the Export Regulations to be exported to South America.

"GOOD" GRADE.

Fruit packed in accordance with the requirements of "Good" grade may be exported to European markets only. The standard of the grade shall be as provided by the 1925 export conditions, the principal of which are:—

Grade.	Colour.				Defects.
	Solid Red.	Partial Red.	Striped.	Yellow or Green.	
	Per Cent.	Per Cent.	Per Cent.		
Good ..	30	15	10	Good characteristic colour	5 per cent. blemish or 15 per cent. unnatural russet.

The varieties for export under this grade shall be as set out in the European export list, excepting that the minimum size of any variety shall be not less than 210 apples per case, other than Cleopatra, Dougherty, Jonathan, King David, Sturmer, and Yates, the minimum size of which shall not be less than 225, and Cox's Orange 240 per case.

PEARS.

The following varieties are approved for export to Europe:—

Max. Size.	Variety.	Min. Size.	Max. Size.	Variety.	Min. Size.
In.		In.	In.		In.
2¾	Josephine de Malines	2¼	2¾	Winter Cole	2¼
2¾	P. Barry	2¼	2¾	Winter Nelis.. ..	2¼
2¾	Packham's Triumph ..	2¼			

Other varieties, up to 500 cases, may be approved for export for experimental purposes.

All pears must be of "Extra Fancy" or "Fancy" grades, and be packed in trays constructed as hereinafter provided.

REGISTERED EXPORT NUMBER.

The registered number issued to all growers under the Local Market Regulations will be declared to be the grower's registered export number also. The registered number of each grower must be branded on each case of fruit exported by him.

In respect to fruit packed by a packing organization to which a registered number has been allotted, such consignments may be marked with the registered number of the packing association only, provided that each grower's fruit is shown separately on the advice-note for examination, and stacked in separate lots, so that the Inspector may have no difficulty in determining which is the particular lot under examination. For example, a line of 100 cases of Cox's Orange coming from two different growers would be submitted as follows:—

Shipping-mark.	Registered Export Brand.	Total Number of Cases.	Variety.	Grade.	Number of Cases.	Pack.
345	P607	60	Cox's Orange ..	Fancy ..	14	163
			,, ..	,, ..	14	175
			,, ..	,, ..	8	188
			,, ..	,, ..	12	210
			,, ..	,, ..	12	225
345	P607	40	Cox's Orange ..	Fancy ..	8	163
			,, ..	,, ..	5	175
			,, ..	,, ..	7	188
			,, ..	,, ..	9	210
			,, ..	,, ..	11	225

These would be stacked separately in two lots and examined as different lines.

Should unavoidable circumstances prevent the adoption of this procedure, resulting in a line comprising a larger number of cases being submitted as one line, it must be definitely understood that the examination of same will be solely at the grower's risk, and in the event of any fruit forming a portion of the line being found to be unsatisfactory the whole line will be liable to rejection.

LABELLING AND MARKING.

A coloured label corresponding with that used in the 1925 season has been approved for use in connection with "Extra Fancy" and "Fancy" grade fruit. A non-coloured label of similar design has been approved in connection with "Good" grade fruit. All cases of fruit intended for export must bear a label on each end according to grade, as above indicated.

The marking of cases shall be in accordance with the 1925 season's requirements.

LABELS FOR TRAYS.

Special labels for use on apple and pear trays have been prepared, and will be procurable from the New Zealand Fruitgrowers' Federation.

WRAPPING-PAPER.

Apples of the various sizes as set out below shall be wrapped in paper of the size indicated opposite each respectively:—

Sizes 64's to 80's (both inclusive), paper 11 in. by 11 in.
Sizes 88's to 110's (both inclusive), paper 10 in. by 10 in.
Sizes 120's to 200's (both inclusive), paper 9 in. by 9 in.
Sizes 210's to 240's (both inclusive), paper 8 in. by 8 in.

In the event of the size of the paper used being smaller than that specified above for any respective size of apples, such apples shall be double-wrapped by overlapping two papers.

SPECIFICATIONS OF EXPORT CASE.

The timber recommended for the construction of an export fruit-case is white-pine of good quality, but *Pinus insignis*, rimu, and beech timber, if well and evenly cut, will be accepted. Owing to the unsatisfactory nature of cases constructed of poplar timber, cases of this class will not be approved for export.

The inside measurements of the export bushel case shall be 10 in. by $11\frac{1}{4}$ in. by $19\frac{3}{4}$ in.

Sizes of timber: The ends shall be made of boards of the following size—10 in. by $11\frac{1}{4}$ in. by $\frac{3}{4}$ in.; one-piece board at each end; both end boards to be planed on the outer side. The sides shall be made of boards of the following size—10 in. by $21\frac{1}{4}$ in. by $\frac{5}{16}$ in.; one or two boards optional for each side, provided that no side board shall be less than $4\frac{1}{4}$ in. in width. The tops and bottoms shall be made of boards of the following size—11 in. by $21\frac{1}{4}$ in. by $\frac{5}{16}$ in.; one or two boards optional, provided that no board used for the purpose is less than 5 in. in width. Provided that tops and bottoms may be made of boards of the following size—11 in. by $21\frac{1}{4}$ in. by $\frac{3}{16}$ in., to be used with the addition of four cleats per case, measuring 11 in. by $\frac{3}{4}$ in. by $\frac{5}{16}$ in.

In the event of two-piece sides being used in the construction of the case above referred to, the space between the boards shall not exceed $\frac{1}{4}$ in. In the event of two-piece tops and bottoms being used the space between such boards shall not exceed $\frac{1}{2}$ in.

Nailing: Nails used to be not less than $1\frac{1}{2}$ in. long, 14 gauge. Nails to be spaced not more than 3 in. apart, and the outer nails of each board to be not more than 1 in. from the edge of board.

Strapping: All cases to be strapped with a wire or steel band; such strapping to be tightly applied and to be not more than 1 in. from end of case.

CONSTRUCTION OF TRAYS.

Selected apples and pears may be exported in wooden trays having an inside measurement of $11\frac{1}{4}$ in. by $19\frac{3}{4}$ in., with depth from $2\frac{1}{2}$ in. to 3 in. Each tray to be complete with lid and label. Three trays to be securely wired together, forming one package. Binding-wires to be placed within 1 in. of each end of the package.

In the construction of trays the following is recommended: Bottom of bottom tray and top of top tray to be of two pieces, each $5\frac{1}{4}$ in. by $\frac{5}{16}$ in. Tops and bottoms in all other instances to be of two pieces, each $5\frac{1}{4}$ in. by $\frac{3}{16}$ in. Middle tray to have cleats across each end both top and bottom, thus requiring four cleats $\frac{3}{4}$ in. by $\frac{5}{16}$ in. by 11 in. Constructed in this way, bulge that takes place is inward, owing to the timber being lighter than the outer tops and bottoms. At the same time any such bulge is protected by the cleats, which also keep the trays apart, thus allowing for free ventilation.

CASES AND PACKING.

Specifications of the standard export case shall be strictly observed.

Corrugated strawboard or wood-wool shall be used on top and bottom of cases. All large fruit to be double-wrapped unless paper of sufficient size is used.

MINIMUM CONSIGNMENT.

Twenty cases of any one variety shall be the minimum consignment accepted for export.

Noxious Weeds.—The clearing of noxious weeds on Crown lands was given a considerable amount of attention during the year 1924–25, the larger grant provided by the Lands Department having allowed of this. A grant was also provided by the Native Department for the purpose of dealing to some extent with the large areas of unindividualized Native lands, and this money is being expended as authorized to the best advantage. The work in both cases is carried out by the Department of Agriculture.

ANSWERS TO INQUIRIES.

IN order to ensure reply to questions, correspondents must give their name and address, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

COWS WITH UDDER TROUBLE AND FOOT-ROT.

"X.," Ohinepanea :—

(1.) I have two cows which have udder trouble. Symptoms: Quarter swells; milk goes away to nothing, but is of usual quality; cow loses condition and becomes weak in hind legs. (2.) I have several cows with foot-rot. Last year standing them in sheep-dip (carbolic) cured them, but this year it has not been efficacious so far. Can you suggest remedies?

The Live-stock Division :—

(1.) The cows are evidently affected with mammitis. It would be advisable to milk them last, and by hand, into a kerosene-tin containing a little Jeyes' fluid, and afterwards destroy the milk. Massage the quarters well, using a little camphorated oil as a lubricant, and strip each quarter as frequently as possible. Give each cow ¾ lb. Epsom salts and half a tablespoonful of ginger in a quart of oatmeal gruel sweetened with molasses. In such cases it is as well to forward a sample of milk from each affected quarter to the Officer in Charge, Veterinary Laboratory, Wallaceville, for microscopic examination. (2.) In treating cows with foot-rot, it is best to immerse the foot in a bath of hot water containing some antiseptic. Afterwards paint between the cleft of the hoof and around the hoof-head with strong tincture of iodine. A few dressings in this manner usually effect relief. A tar bandage made by applying a strip of calico smeared with Stockholm tar between the cleft and tied around the top of the hoof prevents dirt entering and further infection.

ARTIFICIAL CULTURES FOR LUCERNE INOCULATION.

Frank Reynolds, Thornton :—

I am sowing about 6 acres of lucerne in the Rotorua district, and would like information regarding inoculation. I hear that there is a substitute for the inoculated soils that we used years ago. Will you please let me know if this is the case?

The Fields Division :—

The amount of field evidence we have regarding the efficacy of cultures in New Zealand is small. As far as the Auckland Province is concerned, we have carried out some pot experiments at Albany Experimental Area, and some field trials at Morrinsville with the culture named "Farmogerm." The trials have been carried on now for a period of two seasons (the present being the second season), and so far the lucerne treated with soil from an old lucerne stand is better than that where the seed was treated with the culture. It is evident, however, that the seed treatment with culture is quite good, and only suffers slightly in comparison with soil inoculation. Both the sets of treated plots are distinctly better than the control plots. The culture is mixed with the seed before sowing, and as it is put up in different sizes you should ask for enough for 6 acres.

HAND FEEDING OF YOUNG PIGS.

P. Hodder, Carterton :—

Please advise as to the hand feeding of young pigs from birth. I had a sow which had a litter and died the next day. I am at present feeding the little pigs with a teat on a bottle, and giving them as much as they can drink, about every two hours, of cow's milk and water, about half and half, with a tablespoonful of lime-water every feed among ten pigs.

The Live-stock Division :—

In general, rearing young pigs by hand on the bottle or a spoon is not a success ; it requires great patience and perseverance. It is not generally understood that a great difference exists between sow's milk and the substitute usually used—cow's milk. The butterfat globules of the sow's milk are one-quarter the size of those of cow's milk but are in much larger numbers, allowing it (sow's milk) to be more easily digested. Cow's milk should not be diluted with water, as this makes the food a weak one. Milk from Jersey cows would be all right but other milk of a lower butterfat content should be strengthened by the addition of a little cod-liver oil. The oil should be mixed with the milk at blood-temperature—a teaspoonful for a start and increased later. Lime-water can also be added at intervals. This will be sufficient until the pigs are three weeks old ; then a little meal may be added to the ration.

FRUITING OF APRICOT-TREES.

E. E. T., Whakatane :—

Do you know of anything to make apricot-trees bear fruit ? I have three seven-year-old trees ; they grow luxuriantly and have a few flowers, but no fruit. Would sulphate of iron or basic slag help them ? I have not pruned them for two years.

The Horticulture Division :—

The experience you are having with your apricot-trees is of the usual kind. In very few districts—and those usually of the driest—is the apricot-tree found to bear consistently. If the wood in the tree is very crowded, thin it out in winter, each branch removed being cut out at the base or just above a lateral. Follow this up by summer pruning. Applications of lime and phosphates would very possibly be beneficial ; the basic slag might be tried first.

DESTRUCTION OF GIANT FESCUE.

F. O., Wanganui :—

Can you inform me of the best method of destroying giant-fescue grass ? It lines a large portion of our pig-proof fences, and therefore to grub it out would be a lengthy job.

The Fields Division :—

Grubbing is the most effective way of clearing giant fescue. It could be destroyed, however, by spraying with an arsenic weed-destroyer. If you wish to make your own mixture, boil 1 lb. white arsenic and 2 lb. washing-soda in 1 gallon water. When fully dissolved, use at the rate of one part of solution to twenty of water. Spraying should be done on a dry day, and several sprayings will be necessary to kill the grass right out. As there is danger from poisoning, all stock would have to be kept off until after a good rain.

TOUGH MILKERS.

"INQUIRER," Pukeatua :—

I have a cow which is very tough to milk. Is there any instrument that could be inserted in the teats to make the holes larger, so that she would milk easier ? Any advice on this matter would be appreciated.

The Live-stock Division :—

There are few large commercial herds that do not include one or two cows that are hard to milk, owing partly to the contracted state of the sphincter and smallness of the orifices of the teats, or to a natural tendency on the part of some cows to hold their milk. There is an instrument that can be used, known as a milk or teat siphon, which is procurable at most chemists. It is inserted up each teat-duct, and the milk allowed to run off. It is inadvisable, however, to use such

an instrument unless absolutely necessary, owing to the danger of introducing bacterial infection causing mammitis. When used, it must be carefully sterilized by boiling for ten minutes each time before use, and in-between times kept in a clean place. It is much preferable to persevere with hand manipulation and observing regular milking-hours before resorting to the use of the instrument.

GRASS-MIXTURE FOR BUSH-BURN IN RAKAUNUI DISTRICT.

M. R. H., Eketahuna :—

I should like advice as to the best grass-seed mixture to sow on a burn of about 100 acres of second-class bush country, the bush being composed mostly of birch on the ridges, and tawa, konini, rata, hinau, and an odd rimu and totara, with plenty of supplejack. The land is sandstone and papa formation, and is inclined to go to scrub and piripiri after clearing. It is situated south of Rakaunui.

The Fields Division :—

The following mixture, sown immediately after the burn, should suit your purpose: Cocksfoot, 10 lb.; dogstail, 4 lb.; perennial rye-grass, 8 lb.; Italian rye-grass, 3 lb.; Waipu brown-top, 1 lb.; Danthonia pilosa, 2 lb.; subterranean clover, ¼ lb.; white clover, 1 lb.; Lotus major, ½ lb. In damper and richer parts reduce the cocksfoot to 6 lb. and replace the danthonia with 3 lb. meadow-foxtail and 2 lb. timothy.

SPAYED COWS COMING ON HEAT.

"Wharepuni," Tokomaru Bay :—

Would you be kind enough to advise whether spayed cows come on bulling? Last January we spayed a number of cows, but at present many of them are bulling.

The Live-stock Division :—

Spayed cows frequently come on heat at their usual period after the operation, and this may recur several times, especially if the cows have previously had calves.

DEALING WITH LUCERNE CROP FOR ENSILAGE.

J. C., The Hill, Feilding :—

I have a stand of lucerne, about 4 acres, doing fairly well. I cut it four times a year, but find it very difficult to make the first crop into hay. Could you please advise me what size silo I would require to make ensilage with one cut, and the cheapest and best way to make same?

The Fields Division :—

It seems doubtful if the first cut from 4 acres in your locality would yield sufficient to make an ensilage stack, but if the total weight is from 25 tons to 30 tons of green stuff this would permit of a stack 14 ft. by 14 ft. being made, which is the smallest size practicable. This method would probably be the most economical in your case, if only a small quantity is to be made each season. You might be well advised to provide a further small area of a suitable fodder each season to supplement the first cut from your lucerne area—preferably a carbonaceous crop or grass, as this mixture would make a better balanced ration. Should the stack method not suit your requirements, we would recommend excavating a cutting—say, 14 ft. by 14 ft.—in the side of a terrace. This can be conveniently filled by tipping the material from the top level, and is also easy to handle from the bottom level when carting out. With this method it would be desirable to timber the three earth walls as well as the front excavation, placing the planking perpendicularly in order to avoid resistance to the sinking of the material. Portion of the front wall should be constructed in sections to facilitate emptying the silo. Concrete could be substituted for timber if preferred, but sheet iron or steel is to be avoided in silo-construction owing to the corrosion which occurs from the acids in silage.

WEATHER RECORDS: DECEMBER AND CALENDAR YEAR 1925.

Dominion Meteorological Office.

GENERAL SUMMARY FOR DECEMBER.

WARM, dry, and windy weather was experienced during the month of December in most parts of the Dominion, but the contrast between the east coast of the North Island and the west coast of the South Island was most marked. The former had hardly any rainfall and suffered from drought, while the latter had much more than its large average, on account of deluges from two severe westerly storms, which particularly affected Westland and the Southern Alps. The snow melted on the mountains from the combined effect of warm rain and wind, and on the east coast of the South Island rivers were flooded through these factors without any local rainfall.

The first flood came from heavy rains which set in on the evening of the 3rd and continued on the 4th, the totals for the two days being 3·63 in. at Greymouth, 4·66 in. at Ross, 16·30 in. at Otira, and 10·98 in. at Arthur's Pass. For three days (9th, 10th, and 11th) the sums of the falls were 3·83 in. at Greymouth, 5·48 in. at Ross, 14·20 in. at Otira, and 11·88 in. at Arthur's Pass.

The rainfall was excessive along the high country from Tophouse to Queenstown, but deficient on the east side of the ranges. The vegetation of these regions shows a very pronounced and permanent demarcation, which is brought into notice by these two westerly storms.

There were other westerly disturbances during the month, and only one extropical disturbance, which passed too far north to benefit Hawke's Bay. However, a thunderstorm there on New Year's Eve brought some temporary relief from a long spell of drought.

—D. C. Bates, Director.

RAINFALL FOR DECEMBER AND CALENDAR YEAR 1925 AT REPRESENTATIVE STATIONS.

Station.	December.				Calendar Year.	
	Total Fall.	Number of Wet Days.	Maximum Fall.	Average December Rainfall.	Total Rainfall, 1925.	Average Rainfall.
North Island.						
	Inches.		Inches.	Inches.	Inches.	Inches.
Kaitaia	1·50	5	0·48	3·28	50·56	50·87
Russell	2·10	5	1·03	2·05	56·48	48·85
Whangarei	1·88	8	0·80	2·49	57·29	60·24
Auckland	1·12	11	0·38	2·86	39·21	44·23
Hamilton	1·96	9	0·36	3·68	47·97	49·72
Kawhia	1·80	14	0·60	3·21	58·39	52·70
New Plymouth	3·02	14	0·93	4·28	55·05	60·16
Riversdale, Inglewood ..	3·93	14	0·83	7·43	95·53	104·48
Whangamomona ..	3·48	11	0·88	5·98	68·16	79·50
Tairua, Thames ..	1·56	6	0·52	4·30	54·93	65·85
Tauranga	1·90	8	1·30	3·35	52·73	53·28
Maraehako Station, Opotiki	0·80	6	0·54	2·82	55·79	50·77
Gisborne	0·76	2	0·41	2·13	41·64	47·05
Taupo	1·52	6	0·45	3·66	50·72	45·20
Napier	0·01	1	0·01	2·04	25·51	36·58
Maraekakaho, Hastings ..	0·58	2	0·50	2·21	30·18	34·77
Taihape	1·56	7	0·79	3·43	34·89	40·18
Masterton	0·55	6	0·31	2·57	36·94	38·83
Patea	1·55	9	0·55	3·35	39·87	44·05
Wanganui	1·01	4	0·54	2·63	25·79	36·86
Foxton	0·95	5	0·49	2·15	29·04	31·43
Wellington	2·13	11	0·71	3·31	52·17	48·24

RAINFALL FOR DECEMBER AND CALENDAR YEAR 1925—*continued.*

Station.	December.				Calendar Year.	
	Total Fall.	Number of Wet Days.	Maximum Fall.	Average December Rainfall.	Total Rainfall, 1925.	Average Rainfall.
	South Island.					
	Inches.		Inches.	Inches.	Inches.	Inches.
Westport	5·02	24	0·64	6·60	62·38	78·31
Greymouth	12·18	25	2·83	8·95	91·07	104·13
Hokitika	14·98	27	3·32	10·60	123·87	116·53
Ross	19·62	22	4·15	12·04	158·64	136·86
Arthur's Pass	32·05	18	10·08	12·02	179·16	147·11
Collingwood	4·38	17	1·21	8·01	91·90	99·81
Nelson	0·75	8	0·26	2·67	38·49	37·84
Spring Creek, Blenheim ..	0·74	8	0·30	1·93	31·13	30·31
Tophouse	7·55	19	2·15	5·00	68·81	60·78
Hanmer Springs ..	0·63	4	0·33	2·89	53·02	40·88
Highfield, Waiau ..	0·27	2	0·16	2·51	36·59	33·38
Gore Bay	2·80	3	1·88	2·12	35·88	31·63
Christchurch	1·03	7	0·76	2·03	33·42	25·28
Timaru	1·24	11	0·36	2·38	21·53	23·15
Lambrook, Fairlie ..	1·12	6	0·40	2·33	26·54	25·09
Benmore, Omarama ..	4·37	10	1·80	1·77	25·77	24·15
Oamaru	1·92	14	0·30	2·06	21·05	22·03
Queenstown	4·23	12	1·13	2·55	34·22	30·39
Clyde	1·61	11	0·70	1·79	16·85	15·03
Dunedin	2·24	18	0·35	3·50	39·88	35·95
Wendon	1·62	13	0·40	2·95	26·36	30·57
Invercargill	2·64	19	0·46	4·34	37·94	46·48

FORTHCOMING AGRICULTURAL SHOWS.

Waipukurau A. and P. Association: Waipukurau, 22nd January, 1926.
Horowhenua A. and P. Association: Levin, 26th and 27th January.
Rodney Agricultural Society: Warkworth, 6th February.
Te Awamutu A., P., and H. Association: Te Awamutu, 10th February.
Te Puke A. and P. Association: Te Puke, 10th February.
Dannevirke A. and P. Association: Dannevirke, 10th and 11th February.
Pahiatua A. and P. Association: Pahiatua, 13th February.
Masterton A. and P. Association: Solway, 16th and 17th February.
Whakatane A. and P. Association: Whakatane, 17th February.
Taumarunui A. and P. Association: Taumarunui, 17th February.
West Coast A., P., and I. Association: Greymouth, 17th and 18th February.
King-country Central A. and P. Association: Te Kuiti, 18th February.
Rotorua A. and P. Association: Rotorua, 19th and 20th February.
Northern Wairoa A. and P. Association: Mititai, 20th February.
Tauranga A. and P. Association: Tauranga, 24th February.
Ohura A., P., H., and I. Association: Nihoniho, 25th February.
North Kaipara Agricultural Association: Paparoa, 25th February.
Franklin A. and P. Association: Pukekohe, 26th and 27th February.
Omaha and Pakiri A. and H. Association: Leigh, 27th February.
Taranaki Metropolitan Agricultural Society: New Plymouth, 3rd and 4th March.
Waikato Central A. Association: Cambridge, 3rd and 4th March.
Opotiki A. and P. Association: Opotiki, 9th March.
Morrinsville A. and P. Society: Morrinsville, 10th March.
Hawke's Bay A. and P. Society: Autumn Show, Tomoana, 16th and 17th March.
Mayfield A and P. Association: Mayfield, 20th March.
Methven A. and P. Association: Methven, 25th March.
Temuka and Geraldine A. and P. Association: Winchester, 25th March.

INVENTIONS OF AGRICULTURAL INTEREST.

APPLICATIONS for patents, published with abridged specifications in the *New Zealand Patent Office Journal* from 19th November to 17th December, 1925, include the following of agricultural interest :—

No. 52417 : Fencing-wires coupling ; H. A. and V. G. Symes, Fairlie. No. 53366 : Fruit-case-strengthening means ; A. V. Allport, Stoke. No. 54148 : Milking-machine teat-cup support ; E. Sattler, Hurleyville. No. 54666 : Milking-machine ; A. Melotte, Remincourt, Belgium. No. 52704 : Milking-machine pump, pulsator, and releaser ; W. R. Cockburn, Auckland. No. 54851 : Hair-removing from skins ; S. Wilcox, Morgan, South Australia. No. 54556 : Flax-tail cutter ; C. J. Petersen, Foxton. No. 54936 : Cultivator ; A. C. Howard, Moss Vale, N.S.W. No. 55367 : Harvesting-machine ; W. Mitchell, East St. Kilda, Victoria.

Copy of full specifications and drawings in respect of any of the above may be obtained from the Registrar of Patents, Wellington. Price 1s.

IMPORTATION OF GRASS-SEED FROM AUSTRALIA.

THE regulations under the Stock Act relating to the importation of grass-seed from Australia made on 30th July, 1923, have been revoked, and the following regulations made in lieu thereof :—

1. For the purposes of these regulations the term "grass-seed" includes lucerne, clover, and millet seed.

2. The introduction of grass-seed grown in the State of Queensland or the tick-infestation quarantine area of New South Wales is prohibited.

3. Grass-seed grown in the State of New South Wales other than in the tick-infestation quarantine area may be imported into New Zealand subject to the following conditions : (*a*) That prior to shipment to the Dominion it has been subjected to fumigation by carbon bisulphide, at a strength of 10 lb. to 1,000 cubic feet of chamber-space, for a period not less than twenty-four hours ; and (*b*) that it is accompanied by a certificate, signed by the consignor, in the form of the First Schedule hereto, and also by a certificate, signed by an officer of the Department of Agriculture of that State, in the form of the Second Schedule hereto.

4. Grass-seed grown in the States of Victoria, South Australia, Western Australia, and Tasmania may be imported into New Zealand subject to the production of a certificate, signed by the consignor, in the form of the Third Schedule hereto, and also a certificate, signed by an officer of the Department of Agriculture of the State in which it was grown, in the form of the Fourth Schedule hereto.

And it is hereby declared that these regulations shall come into force on the date of publication of this Order in the *New Zealand Gazette*.

The regulations were gazetted on 14th January, including the schedules referred to therein ; the latter are not reprinted here.

BOOKS RECEIVED.

"CATTLE-BREEDING : PROCEEDINGS OF THE SCOTTISH CATTLE-BREEDING CONFERENCE." Edited by G. F. Finlay, Ph.D. ; 495 pages ; illustrated ; price, 12s. 6d. net ; Oliver and Boyd, Edinburgh and London. Consisting of the papers read at the Cattle-breeding Conference held at Edinburgh in 1924 (including several by British Dominions, United States, and European delegates). A valuable record of recent information and knowledge on many aspects of the subject.

"NEW ZEALAND FLOCK BOOK (SOUTH ISLAND)," vol. 21, 1925. Published by the Council of the New Zealand Sheep-breeders' Association (South Island), 151 Worcester Street, Christchurch. The latest issue of this standard publication.

SALE OF MILK FOR HUMAN CONSUMPTION.

REGULATION No. 21 of the regulations under the Dairy Industry Act, 1908, made on 24th December, 1900, has been revoked, and the following amending regulation substituted—taking effect from publication in the *Gazette* of 7th January :—

21. (*a.*) No person or company shall sell or offer for sale for human consumption any milk or cream other than that obtained from a registered dairy, but this provision shall not apply to any milk or cream sold or offered for sale for the manufacture of condensed milk, dried milk, butter, or cheese, or sold or offered for sale in the form of condensed milk, dried milk, butter, or cheese.

(*b.*) In any proceeding for breach of this regulation the onus of proof that such milk or cream was not milk or cream other than that obtained from a registered dairy shall be upon the person or company charged.

(*c.*) In any proceeding for breach of this regulation, if it be proved that any person or company carrying on the trade of purveyor of milk has during any period sold for human consumption milk or cream in excess of the quantities thereof proved to be obtained during that period by such person or company from registered dairies or in the possession of such person or company at the commencement of the period, such proof shall be *prima facie* evidence of a breach by such person or company of the provisions of this regulation, notwithstanding that no evidence may be tendered of any specific sale of milk or cream other than that obtained from a registered dairy.

ENTRY OF STOCK INTO CLIFTON COUNTY.

THE following regulations under the Stock Act, governing the entry of stock into Clifton County on its northern boundary, were gazetted on 23rd December, 1925, and came into force on that date :—

1. For the purposes of these regulations "stock" means live cattle, horses, and dogs; "officer in charge" means the officer in charge of the dip hereinafter referred to.

2. All stock entering the Clifton County on its northern boundary shall cross the Mokau River at what is generally known as Mokau Ferry.

3. After crossing the Mokau River and reaching a point of approximately three miles south thereof on the Auckland–Wellington (via Taranaki) Main Road, all stock shall be dipped in the dip erected adjacent to such road on part of the property known as the Mohakatino Station; provided that in the case of horses, the officer in charge may authorize them to be sprayed in lieu of being dipped.

4. After being dipped or sprayed no stock shall be moved from the holding paddocks, except with the written permission of the officer in charge, and it shall be deemed to be an offence against these regulations if any stock are moved without such written permission.

5. The fees payable in respect of stock dipped or sprayed shall be: Cattle and horses, 6d. per head; dogs, no charge.

6. All fees shall be payable at the time of dipping to the officer in charge.

Australian Agricultural Machinery.—Mr. J. W. Deem, who visited Australia recently, was much impressed by the fine display of locally manufactured agricultural machinery at the Melbourne Royal Show. He states that the machinery in connection with the growing and harvesting of wheat was especially good. It was noticed that a considerable proportion of this was made for use with tractors. Cultivators, harvesters, binders, and drills were very prominent in this respect, one of the drills containing twenty-eight coulters being of particular interest. An implement which is fast coming into prominence is the manure-spreader. It is said that more of these have been sold during the last two or three years in Australia than ever before.

New Rabbit District.—The constituting of the "Marlborough Coast Rabbit District" for the purpose of Part III of the Rabbit Nuisance Amendment Act, 1918, was published (with details of boundaries) in the *Gazette* of 7th January.